Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS**

Founded 1896

Chicago, August 30, 1930 — Issued Every Other Week — Volume XXXIII, No. 18

Member of A. B. C. (Audit Bureau of Circulations) and of A. B. P. (Associated Business Papers). The Oldest Publication and Recognized Authority in This Industry. Net Printing of This Issue 6,000 Copies.

Recognized the World Over as the Leader in Its Field

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS **Founded 1896**

Entered as second-class matter, July 2, 1907, at the Chicago, Ill., postoffice under the Act of March 3, 1879.

Contents for August 30, 1930

Departments

(Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

TRADEPRESS PUBLISHING CORPORATION
542 South Dearborn Street, Chicago, Illinois, U. S. A.
W. D. Callender, President; N. C. Rockwood, Vice-President; C. O. Nelson, Secretary

LONDON OFFICE: Dorland House, Mezzanine Floor, 14 Regent St., S.W. 1.

NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, Los Angeles, Calif., *Contributing Editor*
EARL C. HARSH, WALTER B. LENHART, HUGH SHARP, *Associate Editors*
A. M. STERN, *Assistant Editor*
E. A. SINE, *Production Manager*

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies

FRED S. PETERS, CARL L. WALKER, *Eastern Representatives*
280 Madison Ave., New York City. Tel. Caledonia 4474
GEORGE M. EARNSHAW, *Central Advertising Manager*
1374 West Blvd., Cleveland, Ohio. Tel. Woodbine 8031
RALPH C. SULLIVAN, *Advertising Manager*
NORMAN BOGGS, JAY BOHN, *Western Representatives*
Chicago. Tel. Wabash 3714-3715

TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products. The A.B.C. is an organization which audits and verifies publishers' circulation claims and records.

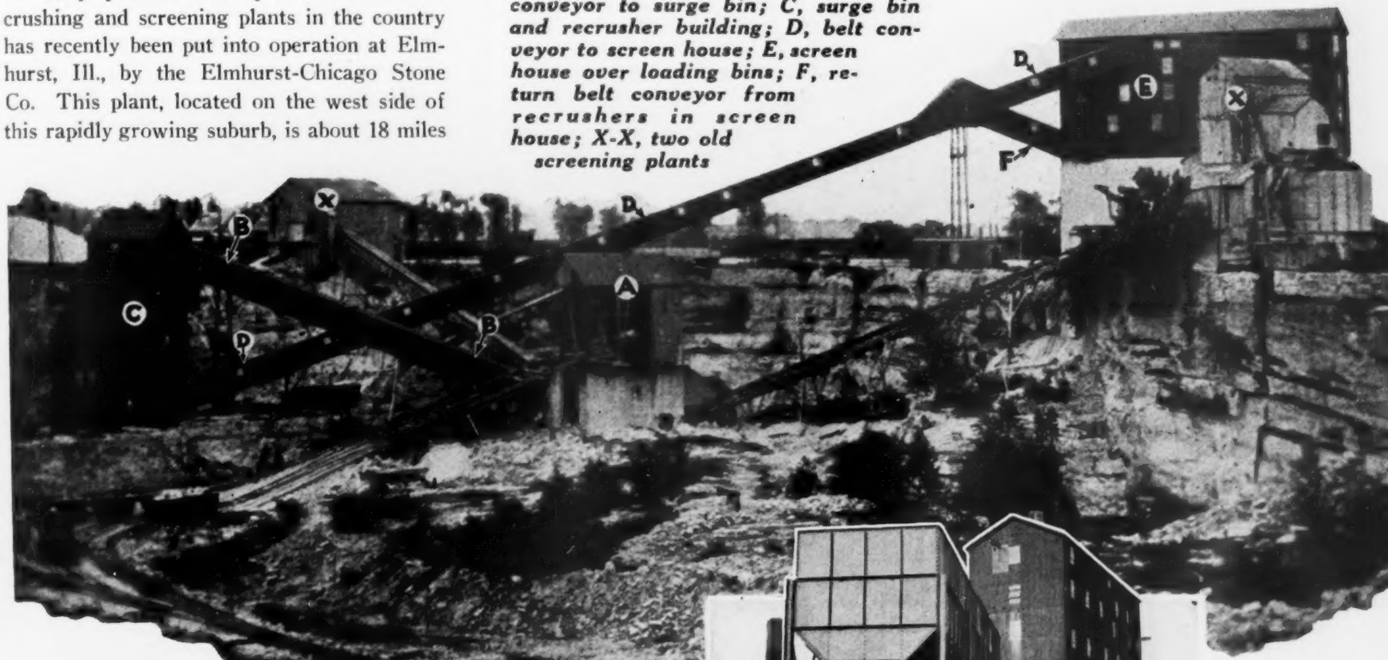
Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS
Founded 1896

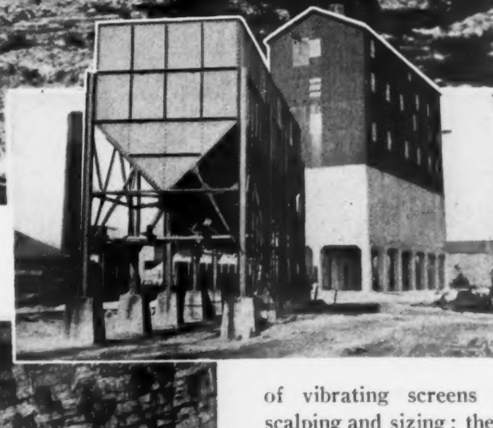
Volume XXXIII Chicago, August 30, 1930 Number 18

Flexibility Aim Of This Crushed-Stone Operation

WHAT IS perhaps one of the most carefully planned and up-to-date limestone crushing and screening plants in the country has recently been put into operation at Elmhurst, Ill., by the Elmhurst-Chicago Stone Co. This plant, located on the west side of this rapidly growing suburb, is about 18 miles west of downtown Chicago and adjoins one of the new super-highways of the Chicago district, as well as the main line of the Chicago and Northwestern Ry. Rail connections are with both this road and the Illinois Central R. R.

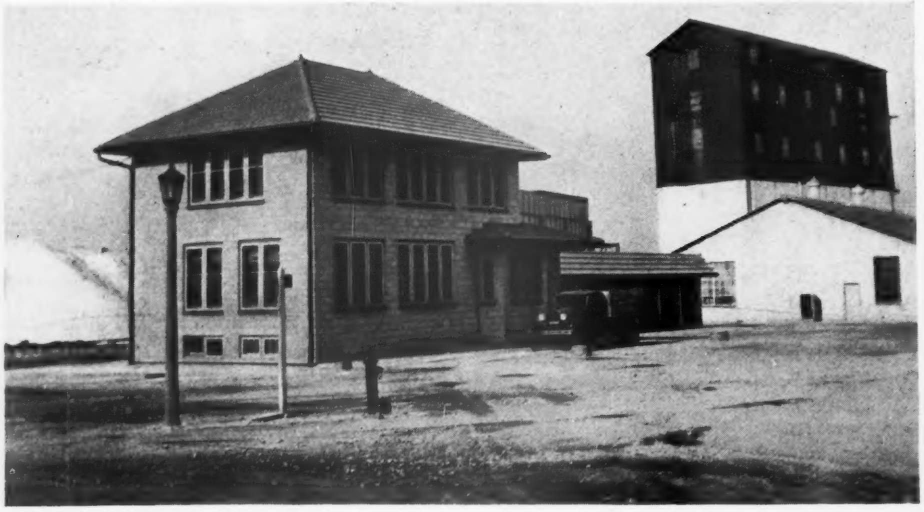
The Elmhurst-Chicago Stone Co. plant showing: A, primary crusher; B, belt conveyor to surge bin; C, surge bin and recrusher building; D, belt conveyor to screen house; E, screen house over loading bins; F, return belt conveyor from recrushers in screen house; X-X, two old screening plants





Steel bins with batchers for loading trucks from storage

The outstanding features of the new plant are: The very carefully worked out spout arrangements from the screens, in connection with the screen and conveyor layout, so that by throwing gates in the various spouts the different sizes of stone may be mixed with others to produce practically any sizes desired, or they may be recrushed; the use of vibrating screens throughout for both scalping and sizing; the use of belt conveyors in place of bucket elevators throughout; the use of a surge or equalizing bin, and a variable speed feeder to control the flow of stone to the screening plant; the automatic, electric-control features, including the starting and stopping of all of the screen-house equipment as one unit from any one of several conveniently located push buttons, as well as the safety device over the surge bin to signal when the surge bin is nearly full,



Elmhurst-Chicago office, garage and shop, with screen house in background

and to stop the main conveyor and feeder if it should become entirely filled.

These features, which will be described more in detail farther on, are a result of the long operating experience of the company and its desire to make this plant one of the best, along with the engineering experience of the Stephens-Adamson Manufacturing Co., which designed the essential details of the plant.

An Operating Record of Fifty Years

This is one of the pioneer crushed-stone operations in the Chicago district, beginning more than 50 years ago in the quarrying of stone for building work. In 1883 a crushing and screening plant was built to utilize the waste rock as crushed stone for road work, and this was rebuilt and enlarged at different times, the operation finally developing into two separate screening units fed by belt conveyors from a single primary crushing unit located on the present quarry floor.

The increasing demands made on this two-unit plant during the past few years led the management to investigate the whole matter of probable future markets and the desirability of a new plant, with the result that in the early part of 1929 work was started on the design of an entirely new plant to replace the two old units, and this was completed and put into operation in May of this year.

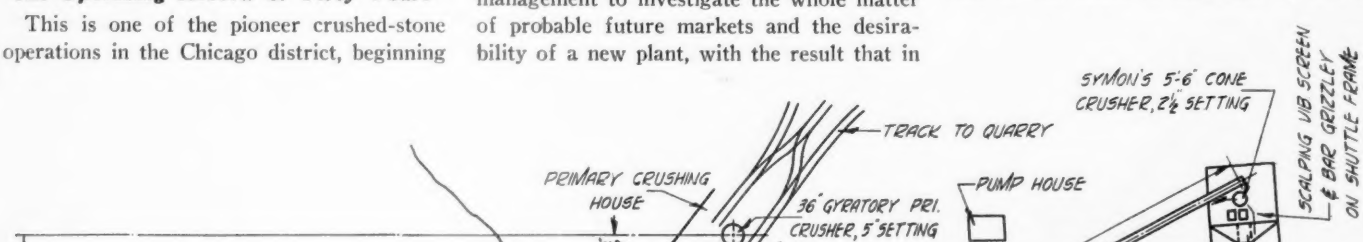
Details of New Plant

The new installation consists of a recrushing building and surge bin located in the

Martin Hammerschmidt, treasurer, and M. M. Bales, superintendent

quarry, and a screen house and loading bins located on top at the road level, with a conveyor connecting them, and also a conveyor from the primary crusher to the surge bin.

The primary crusher remains as it was, and as just stated is connected by belt con-



Plan of Elmhurst-Chicago Stone Co. operation at Elmhurst, Ill.

One end of quarry showing loop system of tracks used

Quarry cars at foot of incline leading to primary crusher

veyor with the new surge bin, from which the crushed rock is drawn to the scalping screen and secondary crusher and then carried on another belt conveyor to the screen house over the loading bins.

The loading bins are of reinforced concrete with partitions to give two rows of six compartments, or 12 compartments in all, each with a capacity of 300 tons. Loading is through bottom bin gates to railroad cars or trucks in the two runways below, which are finished off with smooth concrete floors flush with the tops of the rails.

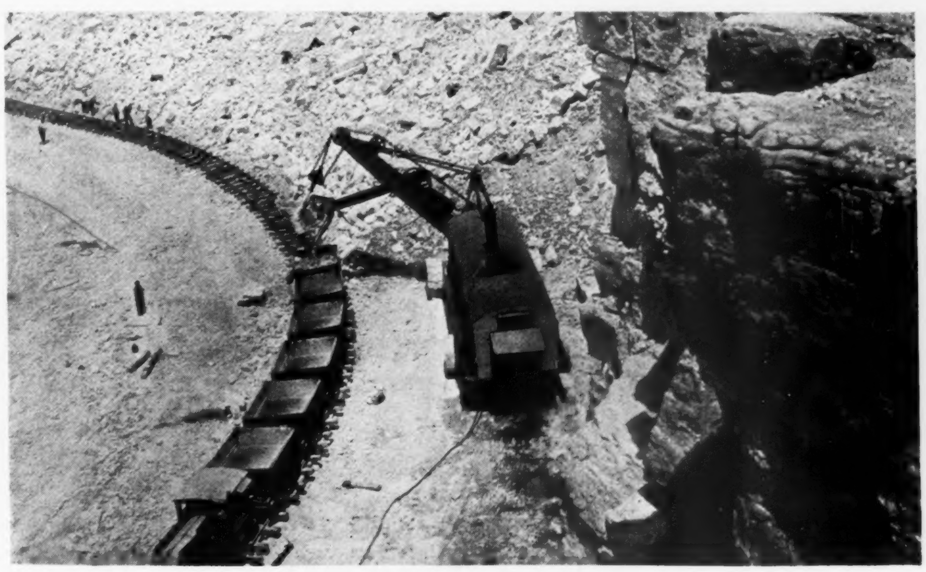
The screen house, surge bin, recrusher building and all conveyor galleries are of steel construction covered with Robertson corrugated protected metal. The product from the plant is used principally for concrete aggregates and road work and some for railroad ballast and agricultural limestone fertilizer, most of it being delivered by truck within a 20-mile radius. The plant is arranged to produce all sizes of crushed stone from "agstone," or minus ⅛-in. size, up to 5-in. size.

In addition to designing the plant, the Stephens-Adamson Manufacturing Co. furnished all screening and conveying equipment, while the structural steel work, including spouts, was fabricated and erected by the Mississippi Valley Structural Steel Co., St. Louis, Mo. The electrical layout was worked out by the Public Service Co. of Northern Illinois, which supplies the power for the plant, and the wiring and electrical installation was done by the White City Electric Co. of Chicago.

Quarrying

The rock deposit is a dolomitic limestone known to be at least 250 ft. deep and covered with from 6 ft. to 20 ft. of overburden, which is removed with a ¾-yd. Osgood caterpillar type steam shovel loading to 6-yd. Kilbourne and Jacobs, side-dump, standard-gage cars. These are hauled in trains of 9 cars by a 20-ton Whitcomb gasoline locomotive. Quarrying is now being done to a depth of 70 ft.

After the stripping has been removed the rock is drilled for blasting by a Loomis



Shovel loading to cars at the face

End view of bins and screen house with belt conveyor galleries

The surge bin and recrusher building with conveyor galleries leading from primary crusher and to screening plant

"Clipper" electric-motor-driven, blast-hole drilling machine at the rate of about one hole per day. The 6-in. holes are drilled 12 ft. back from the face, and are spaced alternately 12-ft. and 24-ft. apart so that an average of 18 tons of stone per foot of hole is obtained. The holes are then loaded with Trojan 40% dynamite and fired by Cordeau-Bickford fuse, the loading of each hole being in three sections with tamping between. Only two holes, those spaced 12 ft. apart, are shot at one time to avoid any objectionable vibration in the nearby residence sections. Because of its nearness to residence districts, and also because of the presence of vertical seams in the rock, it is a difficult quarry to work economically, but this method of drilling and loading with is the result of long experiment and study has given very good results.

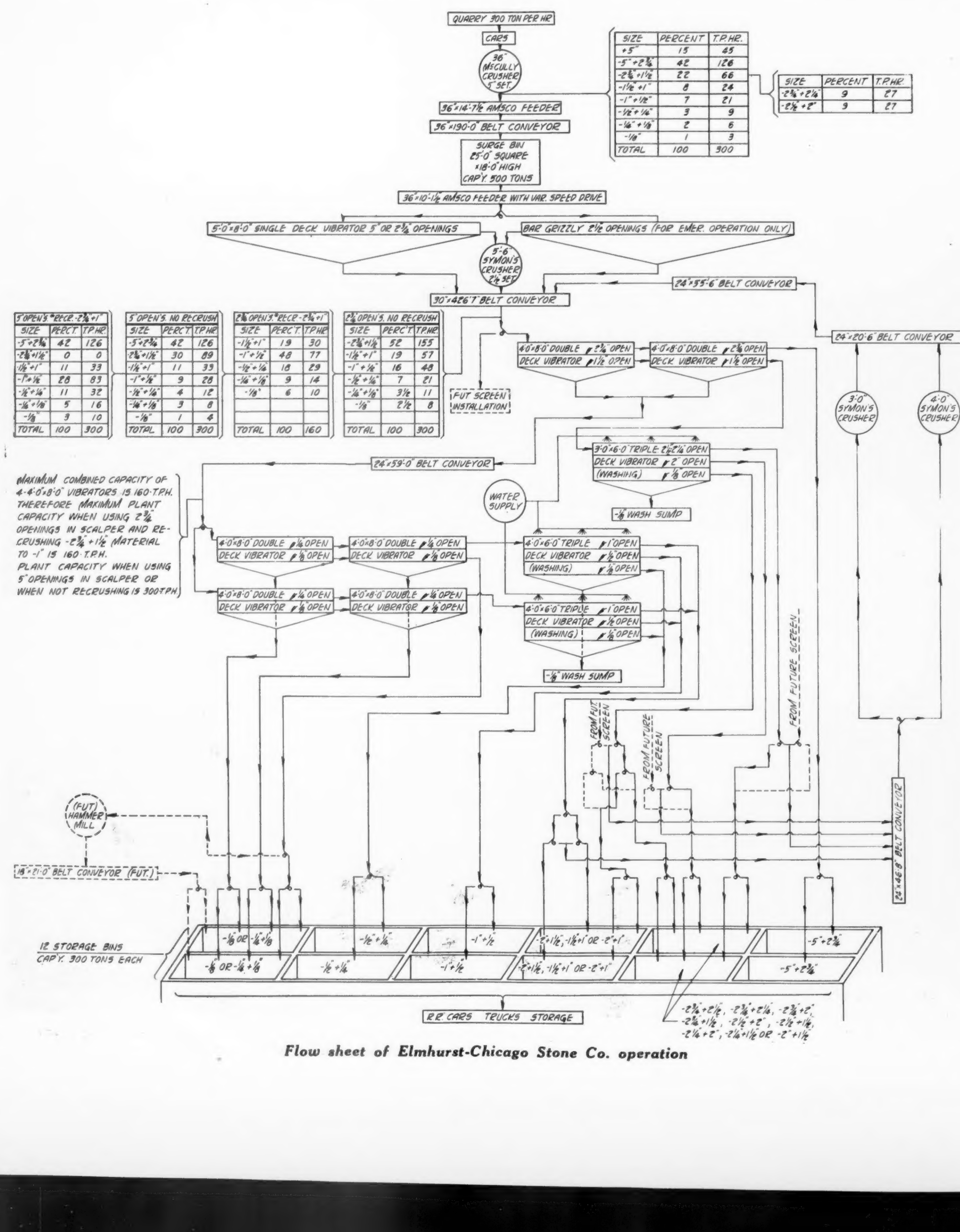
Any large pieces of rock not sufficiently broken down by the primary blast are drilled with Ingersoll-Rand Jackhamers and further broken down by pop shooting.

Compressed air for the secondary drilling as well as for the air hoists for dumping cars at the primary crusher is furnished by a motor-driven Chicago Pneumatic air compressor with a capacity of 200 cu. ft. per min.

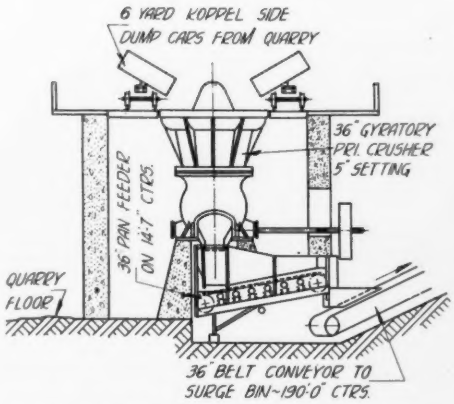
The rock is loaded by two steam shovels, one a No. 73 Osgood and the other a No. 70-C Bucyrus, each with 2½-yd. dippers and mounted on traction wheels, which load to trains of 6-yd. side-dump, steel Koppel cars of special design. These are hauled on standard-gage tracks by Whitcomb gasoline locomotives to the foot of the incline at the primary crusher.

Primary Crushing

The cars from the quarry are drawn up a



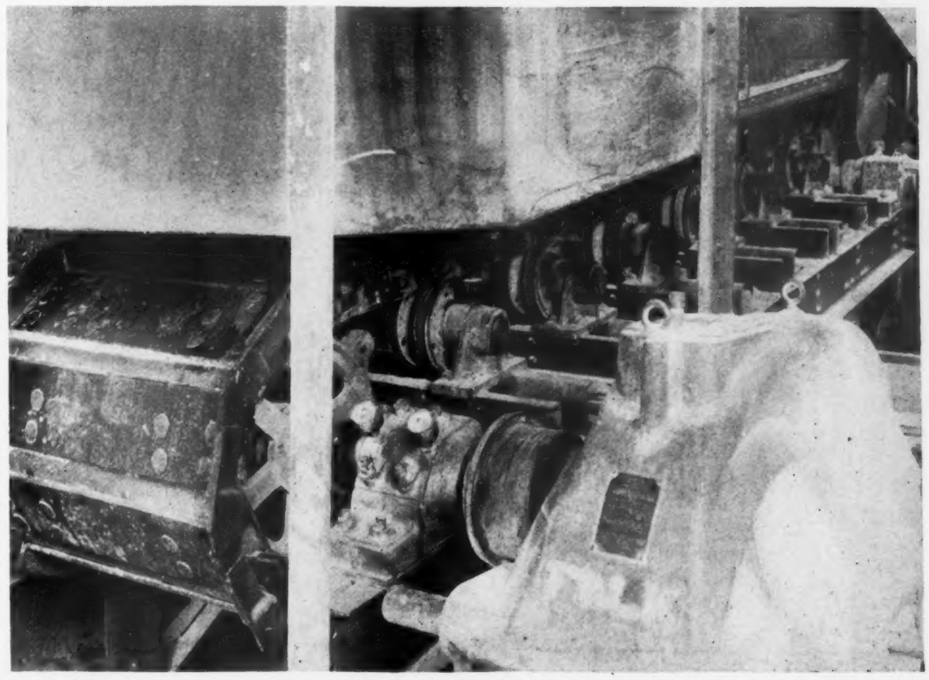
Flow sheet of Elmhurst-Chicago Stone Co. operation



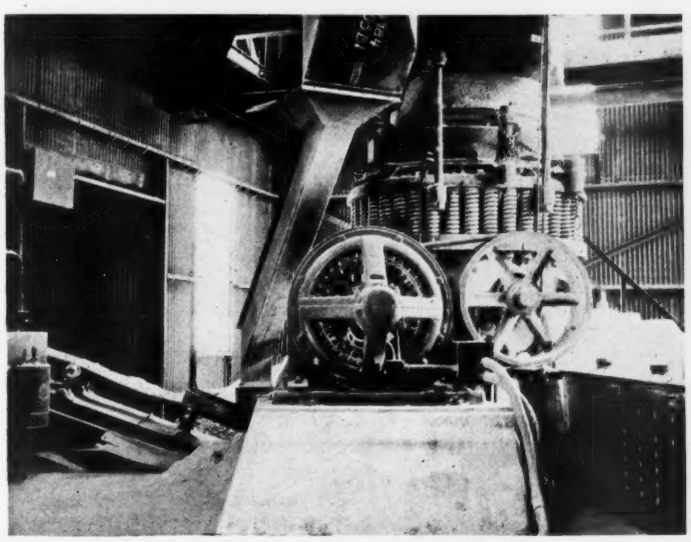
SECTION THRU PRIMARY CRUSHER HOUSE

short double incline with a track on each side of the primary crusher and are dumped into it from either side by Whiting air hoists arranged with hooks which catch under the car body. The dumping as well as the hoisting is all under the control of the hoist operator, stationed at a point above the crusher and overlooking the whole operation.

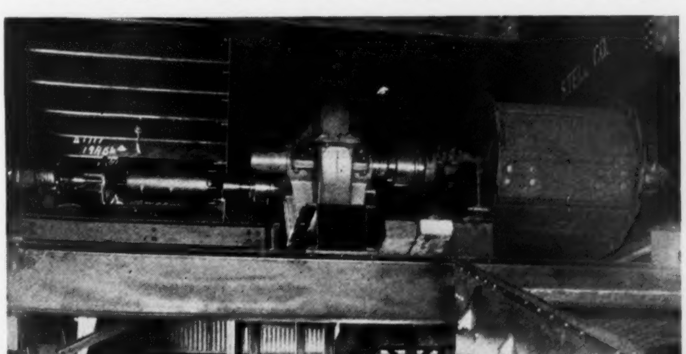
The primary crushing is done by a 36-in. Superior McCully gyratory crusher, which



The 36-in. manganese pan feeder with drive, feeding stone from primary crusher to main 36-in. belt conveyor



At the left is shown the cone crusher under the surge bin. The 30-in. main belt conveyor is in the background. The other picture shows this same belt taken from the screen house at the transfer point indicated by D and F in the illustration on the first page. This is where the recrushed material from the crushers in the screen house is returned to the main belt



View during construction of pan feeder and variable speed reducer under surge bin; vibrating scalping screen at right

Detail view of feeder showing specially designed manganese pans and chain

View under surge bin showing vibrating scalping screen with emergency gravity scalping screen at right

discharges to a 36-in. by 14-ft. Stephens-Adamson pan conveyor feeder with Amsco manganese steel pans, chains and sprockets. The crusher and the two friction hoists which draw the cars up the double incline are driven by a 150-hp., G.-E., slip-ring motor through a rope drive, no change having as yet been made on this part of the plant.

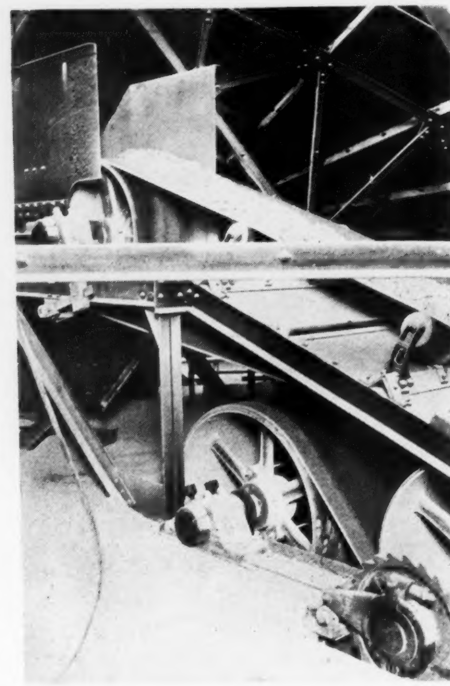
The pan feeder is driven independently by a 7½-hp. Westinghouse motor through a Falk gear reducer.

The material coming over the feeder discharges to a 36-in. by 190-ft. inclined S.-A. belt conveyor carrying up to a bin over the scalping screen and secondary crusher. This conveyor has Simplex carriers with Timken roller bearings arranged with Alemite fittings, and heavy 8-ply "Hewitt Gutta-Percha" belting. It is driven through a Falk reducer by a 40-hp. Westinghouse motor and has an S.-A. silent safety pawl to prevent the loaded belt from reversing in case of power interruption.

Surge Bin a Feature

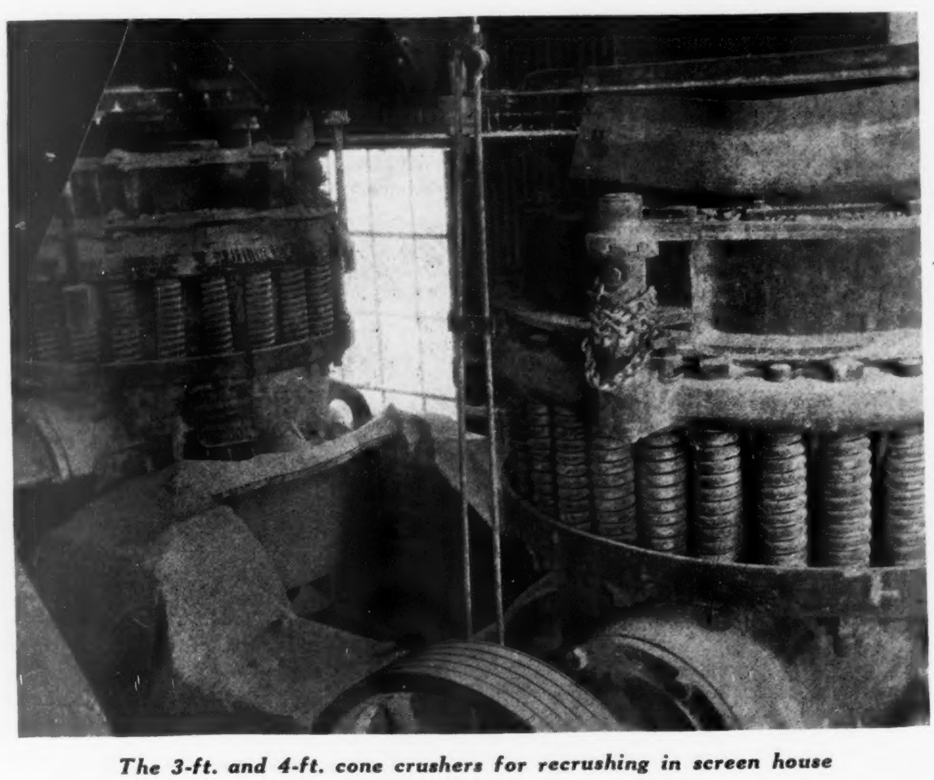
The 36-in. belt conveyor from the primary crusher discharges into a 500-ton capacity surge bin of heavy steel construction located over the scalping screen and secondary crusher, and from which the crushed rock is fed uniformly to the rest of the plant. This use of a surge or equalizing bin to obtain a uniform flow of material over the screens is a most valuable feature in getting a uniformly well screened product as well as maximum output.

A control feature of interest at this point is the way in which over-filling of the surge bin and consequent possible damage to the belt is guarded against. Just below the head pulley of the conveyor and parallel to the head shaft a small shaft, free to turn, is arranged with an arm and plate, or vane, fastened at its center and hanging down. At one end of the shaft an electrical contact device is connected in such a way that any movement of the vane due to the stone filling up under it will make one contact, and a further movement of the vane due to the stone piling to a predetermined maximum height will make a second contact. The first contact lights a signal light at the primary crusher, indicating to the operator there that the surge bin is nearly full and that he should slow up a little in the hoisting and dumping of cars from the quarry, while the second contact is connected into the control circuit of the belt conveyor and feeder, and automatically stops both. The wiring is such that this conveyor and feeder unit are normally started and stopped by push buttons at the primary crusher, but may also be started or stopped at the top of the conveyor over the surge bin.



Head of main 30-in. belt conveyor in screen house. Note duplex pulley drive with silent safety pawl to prevent reversing

Under the surge bin is a second 36-in., pan-conveyor feeder, 10 ft. long, driven by a Westinghouse motor through a Falk gear reducer and a Stephens-Adamson J.F.S. Type



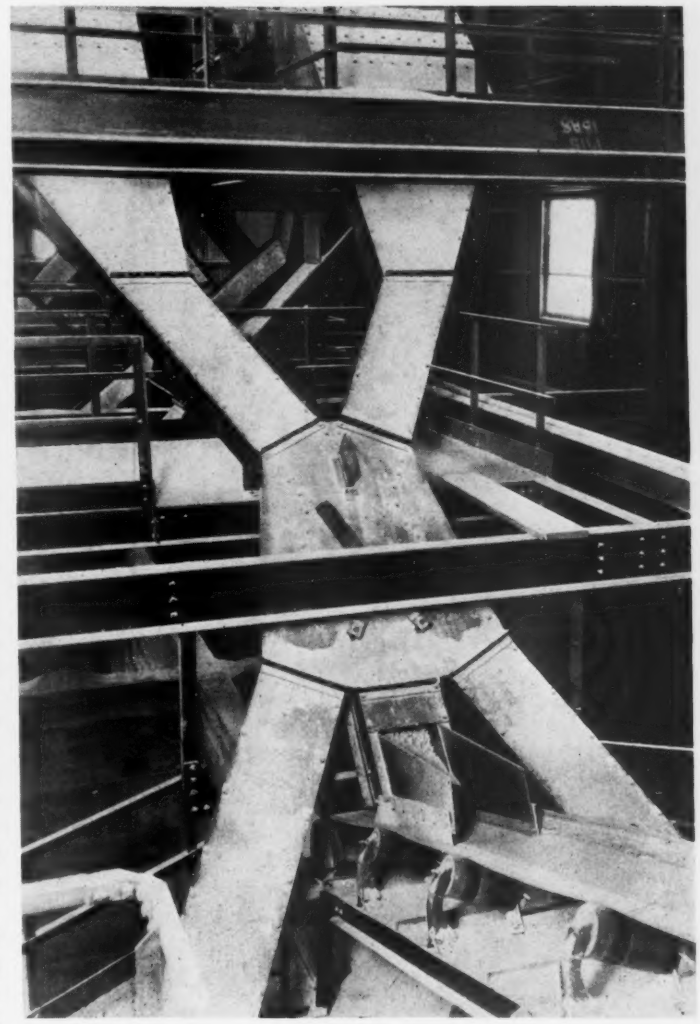
The 3-ft. and 4-ft. cone crushers for recrushing in screen house

R.G. variable speed reducer, which permits regulating the feed from the surge bin so that anything between 60 and 350 tons per hour may be delivered to the rest of the plant.

The feeder discharges to a 5-ft. by 8-ft. single-deck, S.-A. vibrator screen with 2¾-in. mesh wire cloth (which is changed to 5-in. mesh when macadam size is to be made). The oversize falls to a 5½-ft. Symons cone crusher set to crush down to 2½-in., while the undersize along with the recrushed material from the cone crusher is spouted to a 30-in. S.-A. belt conveyor carrying up to the screen house over the loading bins. Both the feeder and vibrator screen are started and stopped by push buttons located in the recrusher building below the surge bin, while the 5½-ft. Symons cone crusher is driven by a 150-hp., G.-E., slip-ring motor through a Texrope drive, and is started with a drum controller at the same location.

Details of interior construction in the screen house

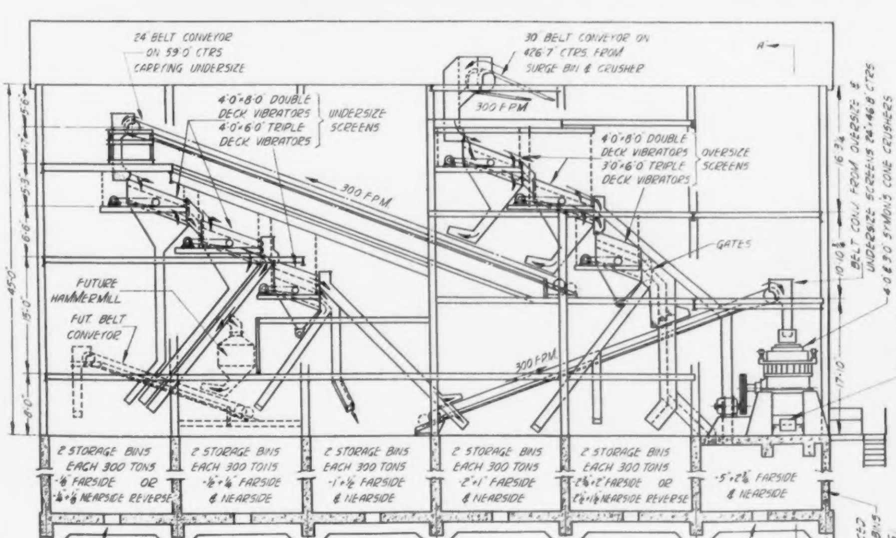
An interesting feature at this point is the arrangement by which, in case of emergency, the vibrator screen may be moved over to one side and replaced by a gravity scalping screen while screen sections are being changed or adjustments made on the vibrator screen. This is accomplished by having both screens mounted on a frame which is arranged with wheels running on a track so that the whole thing may be moved to one side or the other.



View below the screens showing typical spout and gate arrangements

In case it is desired to make larger than 2¾-in. stone, the wire cloth on the scalping vibrator screen is changed.

In passing, the pans and chains of the two 36-in. feeders, one at the primary crusher and one under the surge bin, which were designed and furnished by the American Manganese Steel Co., are of interest in that they were specially designed to prevent sagging between the rollers.



ELEVATION THROUGH SCREEN HOUSE

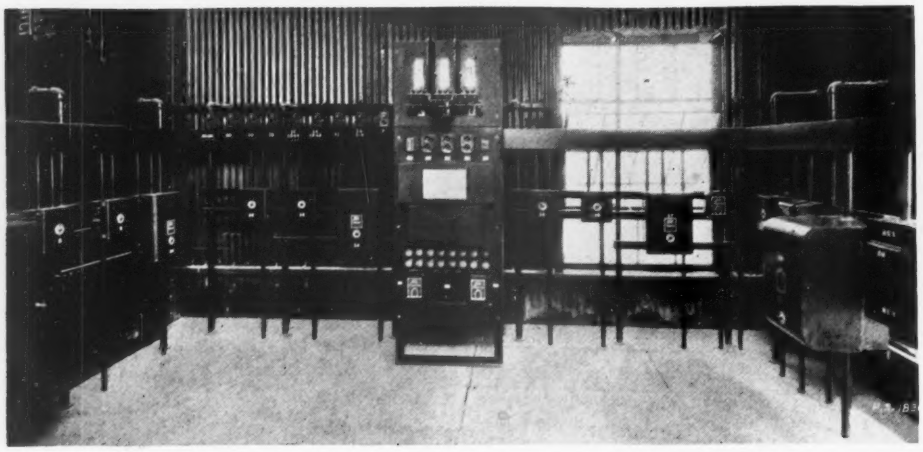
Screen House

The crushed stone passing through the scalping screen, as well as that discharged from the cone crusher, is spouted to a 30-in. by 426-ft. inclined belt conveyor, which carries it up to the finishing screens in the screen house over the loading bins.

This conveyor is of the same type and construction as the other main conveyor and is likewise equipped with an S.-A. silent safety pawl to prevent reversal in case of power interruption when loaded. It is driven by a 75-hp. Wagner motor through a Falk reducer, and on account of its length is arranged with a special drive consisting of two fabric covered pulleys in tandem to prevent slipping.

The screens are arranged in two separate banks, called for convenience the "oversize" screens and the "undersize" screens, and connected by a belt conveyor.

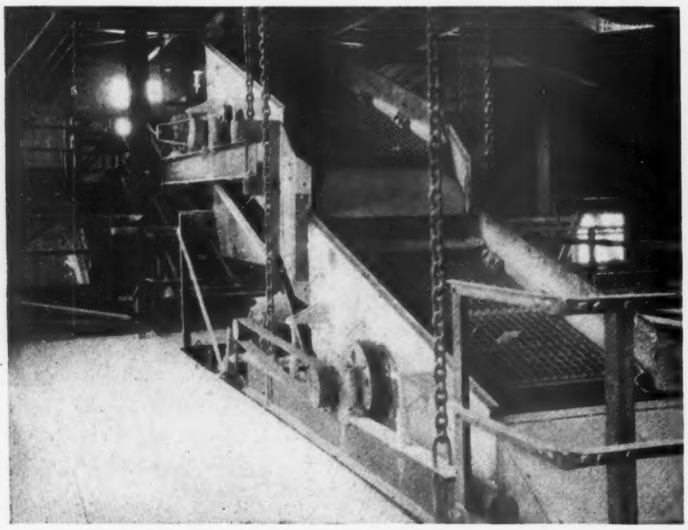
The material coming up to the screen house on the main conveyor discharges to the "oversize" screens, which consist of one

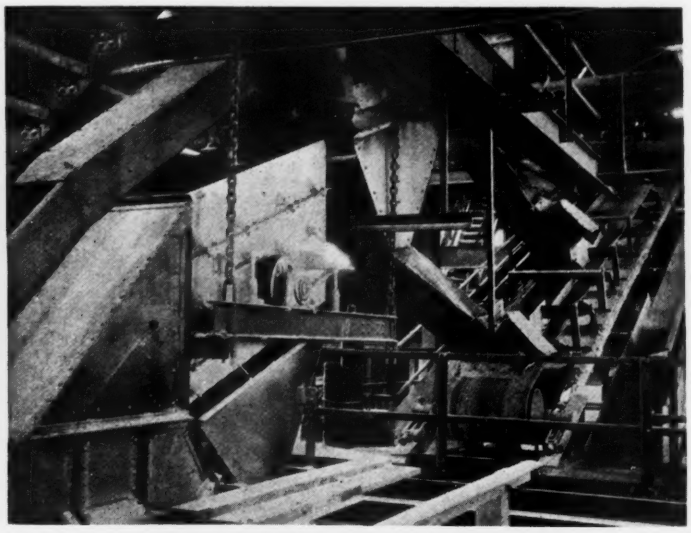


Dust-tight control room in which automatic starters and control panel are located

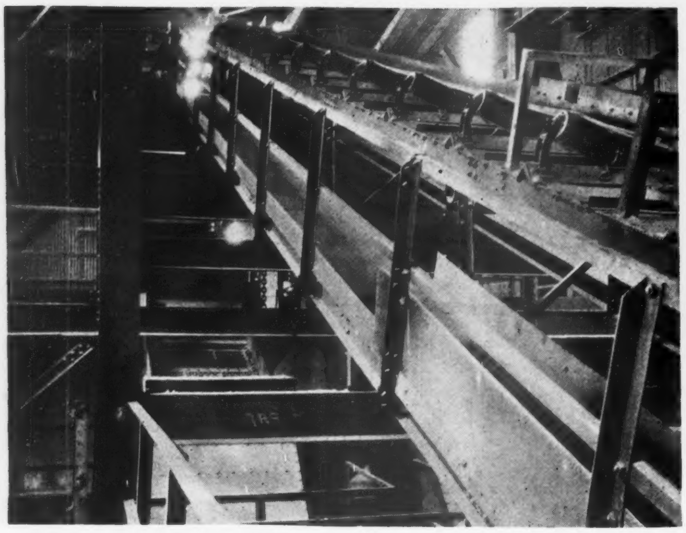
row of three screens in tandem, with space left for the future addition of another row alongside. The first and second screens are each 4-ft. by 8-ft., double-deck, with normally 2¾-mesh cloth on top and 1½-in. mesh cloth below, which take out the minus 1½-in. material and send it on to the "undersize" screens for further sizing, and also make a separation of the 1½-in. by 2¾-in. size to the third screen, and the plus 2¾-in. size (when such is being made) to the bins. The third screen is a 3-ft. by 6-ft. triple-deck, with 2½-in. mesh cloth on top, 2-in. on the second deck and with the lower deck blanked off at present, which permits of making three separations of the 1½-in. by 2¾-in. material coming from the first and second screens, any one or all of which may be either spouted to the bins or returned on a belt conveyor to the 3-ft. and 4-ft. cone crushers for recrushing.

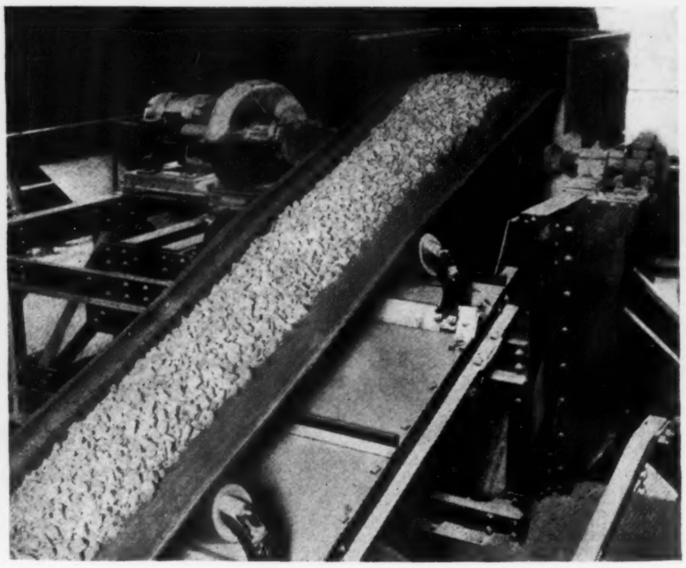
The minus 1½-in. material from these "oversize" screens is carried on a 24-in. by 59-ft. inclined belt conveyor to the bank of "undersize" screens where the stream is divided to two parallel rows of three screens each, in tandem. Considering one row, the first and seconds screens are each 4-ft. by 8-ft. double-deck, with ¼-in. mesh on top and ⅛-in. mesh below, and act as one long screen. The ¼-in. by 1½-in. material from the top deck spouts to the third screen, while the ⅛-in. by ¼-in. size, or screenings over the lower deck, as well as the minus ⅛-in. or agricultural limestone through the lower deck, spouts to the bins. The third screen is 4-ft. by 6-ft. triple deck with 1-in. mesh cloth on top, ½-in. mesh on the second deck and with the bottom deck blanked off at present, so that three sizes, 1-in. by 1½-in.,





Two views of oversize screens, and at right the belt conveyor which carries the minus 1 1/2-in. to the undersize screens



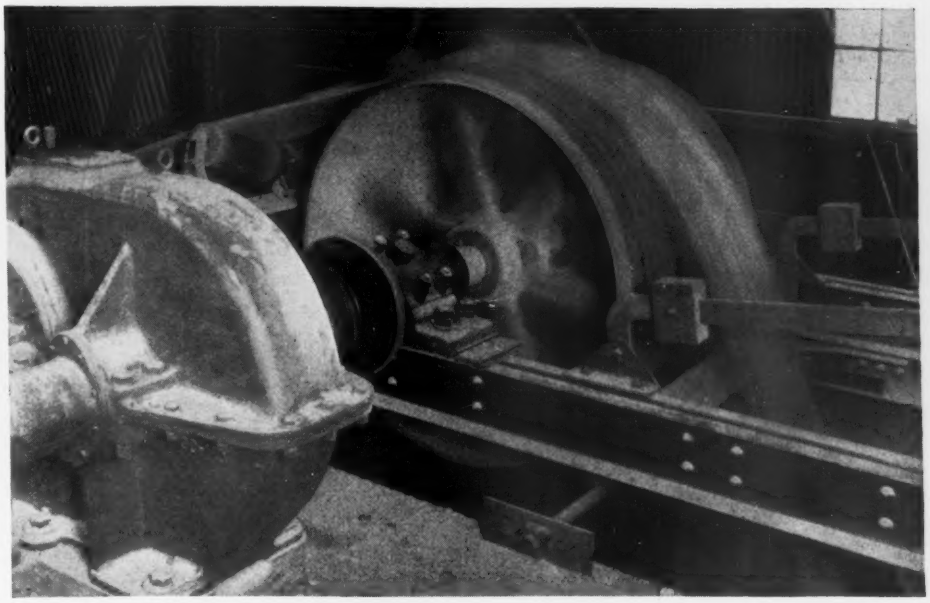


The belt conveyor carrying minus 1 1/2-in. material to undersize screens, showing head, end and drive at the right

½-in. by 1-in. and ¼-in. by ½-in., are produced at this point. The spouts are arranged so that the 1-in. by 1½-in. size may be returned for recrushing if desired. The two triple-deck screens in this bank, as well as the one triple-deck screen in the "oversize" bank, have been installed so that washing of these sizes may be done later, should it become advisable, by using ⅛-in. mesh cloth on the bottom deck and adding a pan to catch the wash water.

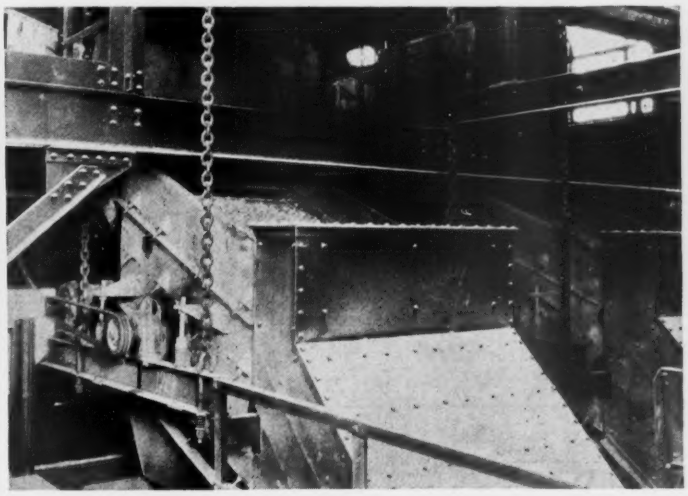
The material to be recrushed is carried back on a 24-in. by 46-ft. inclined belt conveyor to two Symons cone crushers, one a 3-ft. and the other a 4-ft., located over the bins at one end of the screen house. The recrushed material from them is spouted to a 24-in. by 20-ft. belt conveyor feeder, which in turn discharges to a 24-in. by 55-ft. inclined belt conveyor emptying on the main 30-in. belt.

The four belt conveyors in the screen house are of the same makeup as the two long ones already described, having S.-A. Simplex carriers with Timken roller bearings and being driven by Westinghouse motors through Falk reducers, with silent safety pawls on the head shafts.

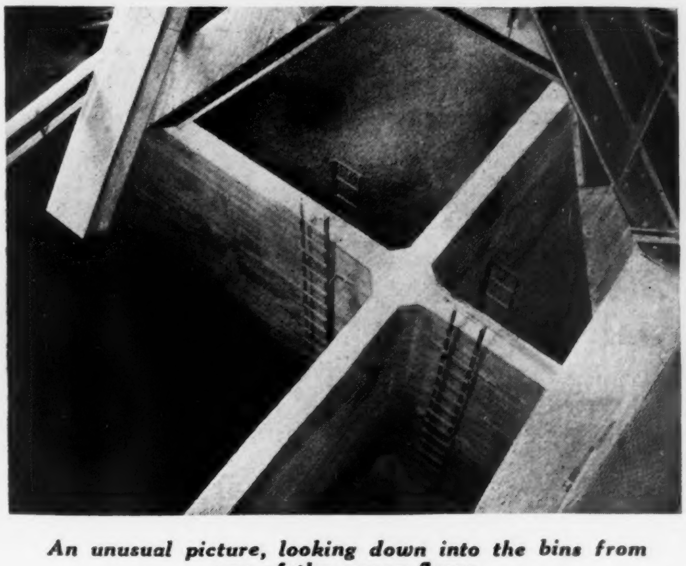


Head of main 36-in. belt conveyor discharging to surge bin. Note shaft below to which control vane is fastened

The nine screens in this building are all Stephens-Adamson vibrator type and are driven by Westinghouse motors through Dayton cog belt drives. They are mounted on I-beam frames which are hung by chains to eliminate any lateral vibration.



Two views of the undersize screens, showing chain suspension and hoppers



An unusual picture, looking down into the bins from one of the screen floors

View under the loading bins showing levers and gates and concrete floor

A glimpse of the storage yards from one end of screen house

These screens are a recent development with a number of good features, including the quick release screen clamps which permit quick changing of the screen cloth.

The arrangement of the screens and the spouts below them has been carefully worked out so that by turning the swing gates in the spouts various combinations of sizes may be put into the different bins below.

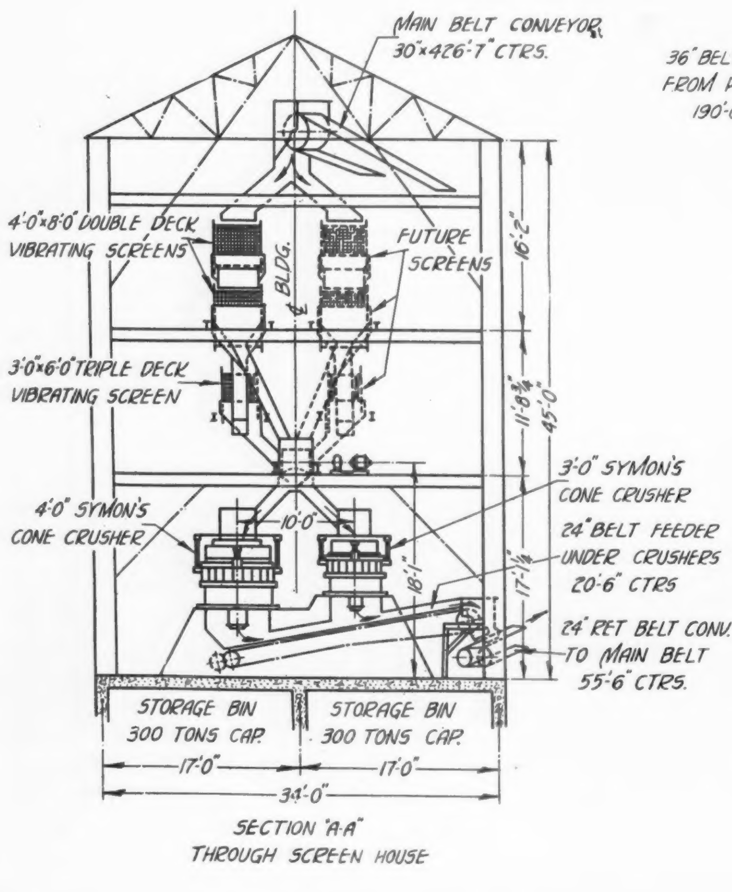
Electrical Control

Of special interest also is the system of control used to start and stop the various units in the screen house. Each unit has of course its individual motor, and all motors have automatic starters with push-button control. The control circuits are interconnected through relays in such a way that the various units are all automatically started in sequence from any one of several buttons conveniently located. The starting is in a sequence opposite to the flow of the material; the screens first, then the recrushers and short belt conveyors and last the long belt conveyor from the surge bin, with an interval of about eight seconds between the different units. In case of the overloading and stopping of any one motor the other units are automatically stopped also, and the control circuits of the motors driving the feeder, screen and crusher under the surge bin are interconnected with the screen house so that they cannot be operated unless the main 30-in. belt conveyor is running.

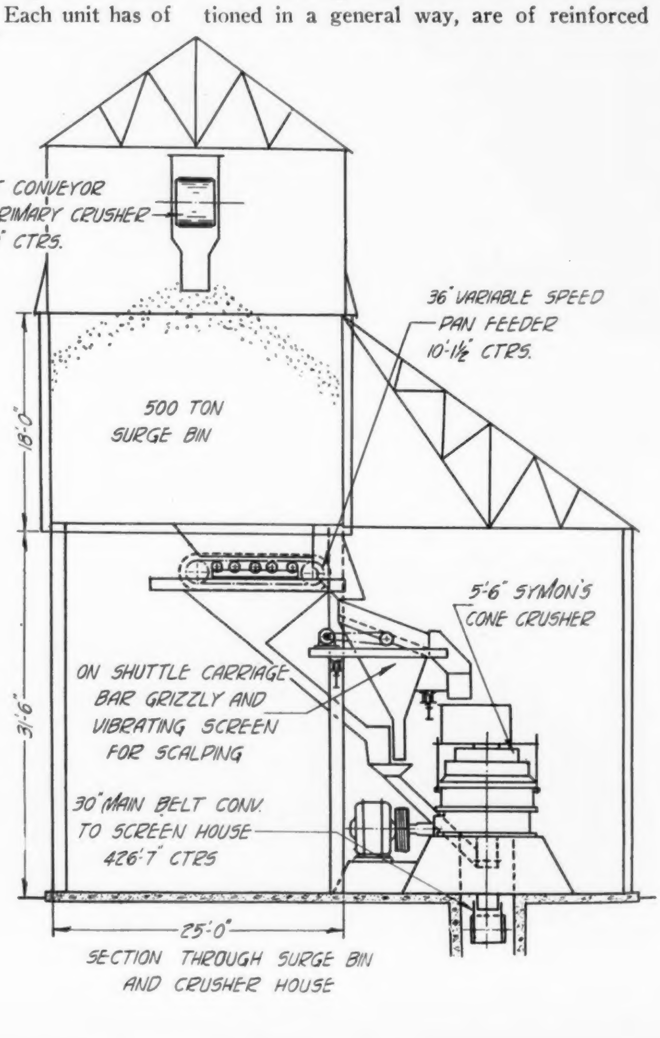
The control boxes and panel are all grouped in a dust-tight control room on one of the upper floors. The control equipment was furnished by the Cutler-Hammer Manufacturing Co. All wiring, not only inside the buildings but from the screen house down into the quarry, is in conduit. Electric power, furnished by the Public Service Co. of Northern Illinois, is brought in on high tension lines and transformed down to 3-phase 60-cycle 440-volts in a substation at the plant.

General

The loading bins, which have been mentioned in a general way, are of reinforced



SECTION "A-A"
THROUGH SCREEN HOUSE



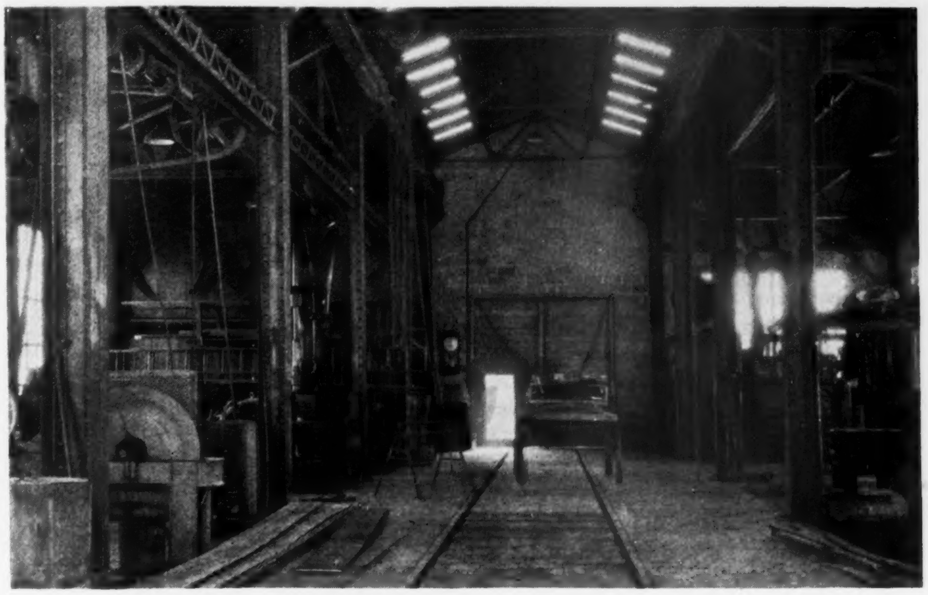
SECTION THROUGH SURGE BIN
AND CRUSHER HOUSE

concrete 35 ft. wide by 40 ft. high by 103 ft. long with an aggregate capacity of 3500 tons, and are arranged with two railroad tracks underneath. The crushed stone is discharged either to railroad cars or trucks through sliding gates controlled from the ground by levers. The unusual thing about the lower part of these bins is that a fine smooth concrete floor flush with the tops of the rails has been provided for the trucks.

The buildings and conveyor galleries, which are of steel construction, have been designed with ample room so that they will accommodate larger units should it be desired to increase the size of these units later. As at present equipped, the plant has a capacity of about 300 tons per hour normally, and somewhat less when doing any considerable amount of recrushing.

An interesting detail of construction is the conveyor gallery floors, which are made up of pre-cast, reinforced concrete slabs of ribbed or channel section. These are in lengths which extend across the width of the gallery and in about 2-ft. widths, and were made at the company's concrete-block plant adjoining the stone plant. All of the construction details, such as stairs, railings, floor plates, toe boards, etc., as well as spouts and gates, have been worked out and finished in a most complete manner. Channel sections filled with concrete have been used for stair treads. Provision has also been made throughout for the handling of repair parts with chain hoists from I-beam trolleys overhead.

Interior of Elmhurst-Chicago offices with weighing room at right



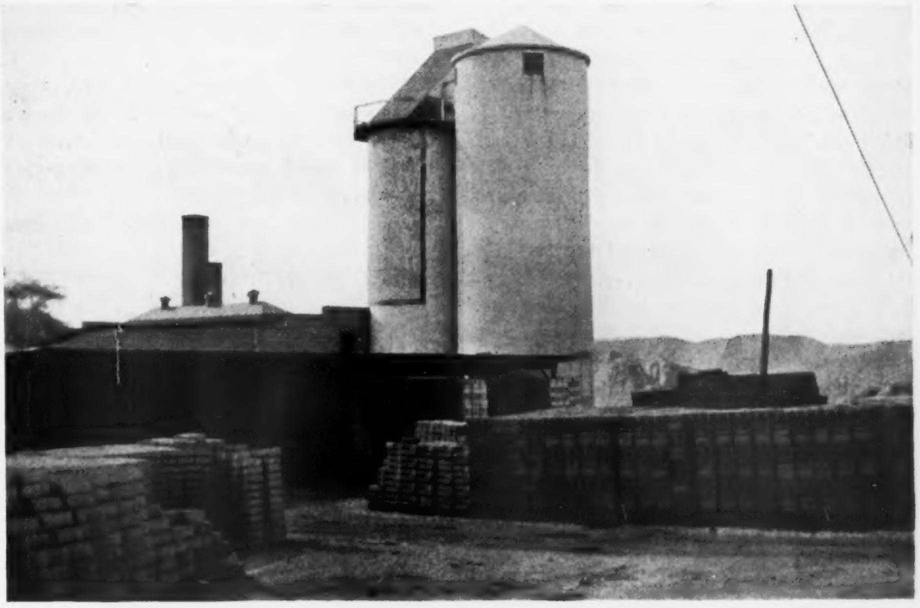
Looking into machine shop at the Elmhurst-Chicago plant

On all those units where Falk speed reducers are used, which include units not having V-belt drives, Falk-Bibby flexible couplings are used between the motor and reducer and between the reducer and the driven shaft.

The plant is arranged with a very complete system of railroad tracks at the bins and extending beyond in both directions to storage yards, where stockpiles of the various sizes of crushed stone are maintained. These piles are made by two 20-ton locomotive cranes, one an Orton and Steinbrenner and the other a McMyler-Interstate, both equipped with a 1¾-yd. Blaw-Knox "Dreadnaught" clamshell bucket. The cranes also load out from storage to railroad cars and to a set of four Butler steel bins with volume batchers for truck loading from storage.

In addition to the new crushing and screening plant the concrete block plant, shop, garage and office building are all very worthy of note.

The concrete-block plant just across the road from the rest of the operation was built



The Elmhurst-Chicago concrete block plant

DATA ON MOTORS INSTALLED AND METHODS OF DRIVING AT ELMHURST-CHICAGO STONE CO. PLANT

UNIT DRIVES		
MACHINERY UNIT	MOTOR	HOW DRIVEN
36" PRIMARY GYRATORY CRUSHER	150 HP. 600 R.P.M. G.E. (SLIP RING)	MANILLA ROPE DRIVE
36"×14'-7" PAN FEEDER	7½ HP. 900 R.P.M. WESTINGHOUSE	FALK GEAR REDUCER
36"×190'-0" BELT CONVEYOR	40 HP. 1200 R.P.M. WESTINGHOUSE	FALK GEAR REDUCER
36"×10'-1½" PAN FEEDER	5 HP. 900 R.P.M. WESTINGHOUSE	FALK GEAR RED. & J.F.S. VAR. SPEED RED.
5'-0"×8'-0" SCALPING VIBRATOR SCREEN	5 HP. 1800 R.P.M. WESTINGHOUSE	DAYTON COG BELT DRIVE
5'-6" SYMON'S CONE CRUSHER	150 HP. 600 R.P.M. G.E. (SLIP RING)	TEXROPE DRIVE
30"×426'-7" BELT CONVEYOR	75 HP. 900 R.P.M. WAGNER	FALK GEAR REDUCER
4'-0"×8'-0" VIBRATOR SCREEN (OVERSIZE)	5 HP. 1800 R.P.M. WESTINGHOUSE	DAYTON COG BELT DRIVE
4'-0"×8'-0" VIBRATOR SCREEN (OVERSIZE)	5 HP. 1800 R.P.M. WESTINGHOUSE	DAYTON COG BELT DRIVE
3'-0"×6'-0" VIBRATOR SCREEN (OVERSIZE)	5 HP. 1800 R.P.M. WESTINGHOUSE	DAYTON COG BELT DRIVE
24"×59'-0" BELT CONVEYOR	10 HP. 1800 R.P.M. WESTINGHOUSE	FALK GEAR REDUCER
2-4'-0"×8'-0" VIBRATOR SCREENS (UNDERSIZE)	2- 5 HP. 1800 R.P.M. WESTINGHOUSE	DAYTON COG BELT DRIVE
2-4'-0"×8'-0" VIBRATOR SCREENS (UNDERSIZE)	2- 5 HP. 1800 R.P.M. WESTINGHOUSE	DAYTON COG BELT DRIVE
2-4'-0"×6'-0" VIBRATOR SCREENS (UNDERSIZE)	2- 5 HP. 1800 R.P.M. WESTINGHOUSE	DAYTON COG BELT DRIVE
24"×46'-8" BELT CONVEYOR	5 HP. 900 R.P.M. WESTINGHOUSE	FALK GEAR REDUCER
3'-0" SYMON'S CONE CRUSHER	50 HP. 900 R.P.M. ALLIS CHALMERS	TEXROPE DRIVE
4'-0" SYMON'S CONE CRUSHER	60 HP. 900 R.P.M. HOWELL	TEXROPE DRIVE
24"×20'-6" BELT FEEDER	2 HP. 1200 R.P.M. HOWELL	FALK GEAR REDUCER
24"×55'-6" BELT CONVEYOR	7½ HP. 900 R.P.M. WESTINGHOUSE	FALK GEAR REDUCER
	612 HP.	

in 1925, replacing an older plant, and is one of the best plants of this kind in the district. It of course uses part of the screenings produced by the stone plant, and in it were made all the blocks used in the construction of the shop, garage and office building. (This plant was described in ROCK PRODUCTS, January 9, 1926.)

The shop, completed in 1927, is of substantial concrete-block construction, with steel roof trusses, tile roofing, skylights and large steel sash windows and is equipped to handle almost any kind of blacksmith and machine work. A railroad track through the center and a traveling chain hoist overhead add to the convenience of handling any heavy parts.

The shop equipment includes lathes, drill presses, grinding wheels, a milling machine, power hack saw, hydraulic press and an Armstrong sharpener for well drill bits. Both oxy-acetylene and electric welding are used, a Wilson portable electric welder for the latter and Imperial welding equipment for the former. Of interest is the fact that the acetylene gas used for welding and cutting in the shop is being produced in an Imperial automatic generator. At one end of the shop building are two steel shelved stock rooms for repair parts and supplies.

The office building, which was erected in 1928, is a very attractive and modern two-story and basement building of concrete blocks and green tile roof, with a particularly attractive interior finished in tan stucco plaster and silver gray oak panels. The first floor is given over to the general offices with a separate room for truck weighing, while the private offices of the company officials are on the second floor, with rest room and showers in the basement. All truck weighing is done on a 20-ton Fairbanks platform scale equipped with a Weightograph for quick and accurate readings. Just back of the office is an 8-car garage, also of concrete blocks with a green tile roof. This group of buildings, office, garage and shop, which face the highway and railroad, present an unusually neat and attractive appearance.

The officials of the Elmhurst-Chicago Stone Co. are: Richard Hammerschmidt, president and general manager; George F. Hammerschmidt, vice-president and sales manager; Martin Hammerschmidt, treasurer; Lydia Hammerschmidt, secretary; M. M. Bales, superintendent.

Single Shot Loosens 500,000 Tons of Granite

MORE THAN A half-million tons of granite were shaken loose recently in a gigantic shot near Sacramento to provide rock for the Salt Springs dam on the Mokelumne river in California, required material for which approximates 3,000,000 yd., according to *The Armstrong Driller*.

The shot, said to be the largest and most successful ever made on the Pacific Coast, involved a great amount of intense preparation and engineering skill. The holes for the explosive, 6-in. diameter, were drilled with five Armstrong electrically operated blast hole drills, varying from 140 to 170 ft. deep, spaced approximately 21 ft. apart. The holes were loaded with 116,250 lb. of 40% gelatin extra L. F. (3-in. by 8-in. cartridges) and special No. 1 dynamite, packed in bags. The average main charge consisted of approximately 1000 lb., while deck loads averaged about 1500 lb. Pockets were 10 ft. deep. Stemming averaged 30 ft.

Because water conditions varied, there was not any fixed proportion of gelatin and special No. 1 in the main charge. An average load would be 600 lb. of 40% gelatin and 400 lb. of special No. 1. However, in such holes as much as 1350 lb. of gelatin was used, and in others only 100 lb. To obtain good toe breakage, 9924 ft. toe holes were loaded with 40% gelatin, extra cordeau detonating fuse was used, and the shot was fired from a 440-v. 100-amp. line.

The schedule calls for quarrying and dumping 125,000 yd. of material per month for two years. About 200,000 cu. yd. must be rehandled, piece by piece, to provide the placed rock section on the upstream face. Some of the pieces run as high as 10 tons in weight and are handled by wire rope slings. The fill or clinked-in material is loaded at the quarry by two 4-yd. Bucyrus-Erie electric shovels and in the spillway quarry one 1¾-yd. and one 1-yd. shovel are used.

Just a Moment—

"HE who is silent is forgotten; he who abstains is taken at his word; he who does not advance falls back; he who stops is overwhelmed, distanced, crushed; he who ceases to grow greater becomes smaller; he who leaves off, gives up; the stationary condition is the beginning of the end."

—Amiel.

Caves of Pennsylvania

"PENNSYLVANIA CAVES," by Ralph W. Stone, is the title of an illustrated booklet issued by the Topographic and Geological Survey of Pennsylvania. Descriptions of the following commercial caves are given:

Cave	Near	Length, ft.	Route traversed, ft.
Alexander	Lewistown	2000	4000
Crystal	Reading	360	800
Hipple	Waterside	1100	1100
Historic Indian	Franklinville	600	600
Indian Echo	Hummelstown	400	400
Lost Cave	Hellertown	400	800
Onyx	Virginville	250	600
Penn	Centre Hall	1200	2400
Seawra	Alfarata	600	1250
Veiled Lady	Madisonburg	300	600
Woodward	Woodward	450	1200

Mr. Stone also describes these undeveloped caves: Arch Spring, near Tyrone; Bear, Hillside; Bethlehem, Bethlehem; Carpenter, Raubsville; Coburn, Coburn; Conodoguinet, Carlisle; Delaney, Uniontown; Dreibelbis, Virginville; Durham, Riegelsville; Frankstown, Frankstown; Hartman, Stormville; Maiden Creek, Maiden Creek; Mammoth Spring, Reedsville; Mapleton, Mapleton Depot; Naginey, Milroy; Needy, Waynesboro; Port Kennedy, Valley Forge; Redington, Redington; Reese, Dutchtown, and Williamson, Williamson.

A map designating the location of commercial and undeveloped caves is included. The primary purpose of the booklet is to increase the interest of tourists in Pennsylvania caves. Through advertising the state of Virginia has been reaping the bulk of the cave seekers' dollars and many Pennsylvanians have been going outside of their own state to satisfy their craving for cave lore, whereas they have plenty of beautiful cave formations right in their own back yards. Abundance of limestone deposits in Pennsylvania makes caves readily accessible.

The accumulation of drip stone and flow stone and the size of stalagmites suggest that some of the Pennsylvania caverns have been formed thousands and thousands of years ago, according to Mr. Stone. Stalactite is the name given formation downward or from the ceiling and stalagmites are built up from the floor. In many cases the two have united and formed pillars of extraordinary beauty.

High-Early-Strength Concrete

Two Ways of Obtaining It—With the Conclusion That the Better Way Is with Present Standard Portland Cement

By S. Rordam

THE ADVENT of modern quick-hardening cements has focussed the attention of engineers and contractors on the question of high-early-strength concrete, i. e., concrete which will develop in two to three days a strength equal to what formerly was considered the normal strength at three to four weeks.

Some of the quick-hardening cements may develop an initial strength which is two to three times higher than the corresponding strength of ordinary portland cement, but at later periods the difference is less pronounced. In some cases an ordinary portland cement may show a higher strength at the 28-day period, although at the one and two day periods it had less than half the strength of the quick-hardening cement.

It is by now pretty generally known amongst the makers and users of concrete that the strength of concrete is largely determined by the ratio between the water and the cement in the concrete mix. By controlling and regulating the water-cement ratio

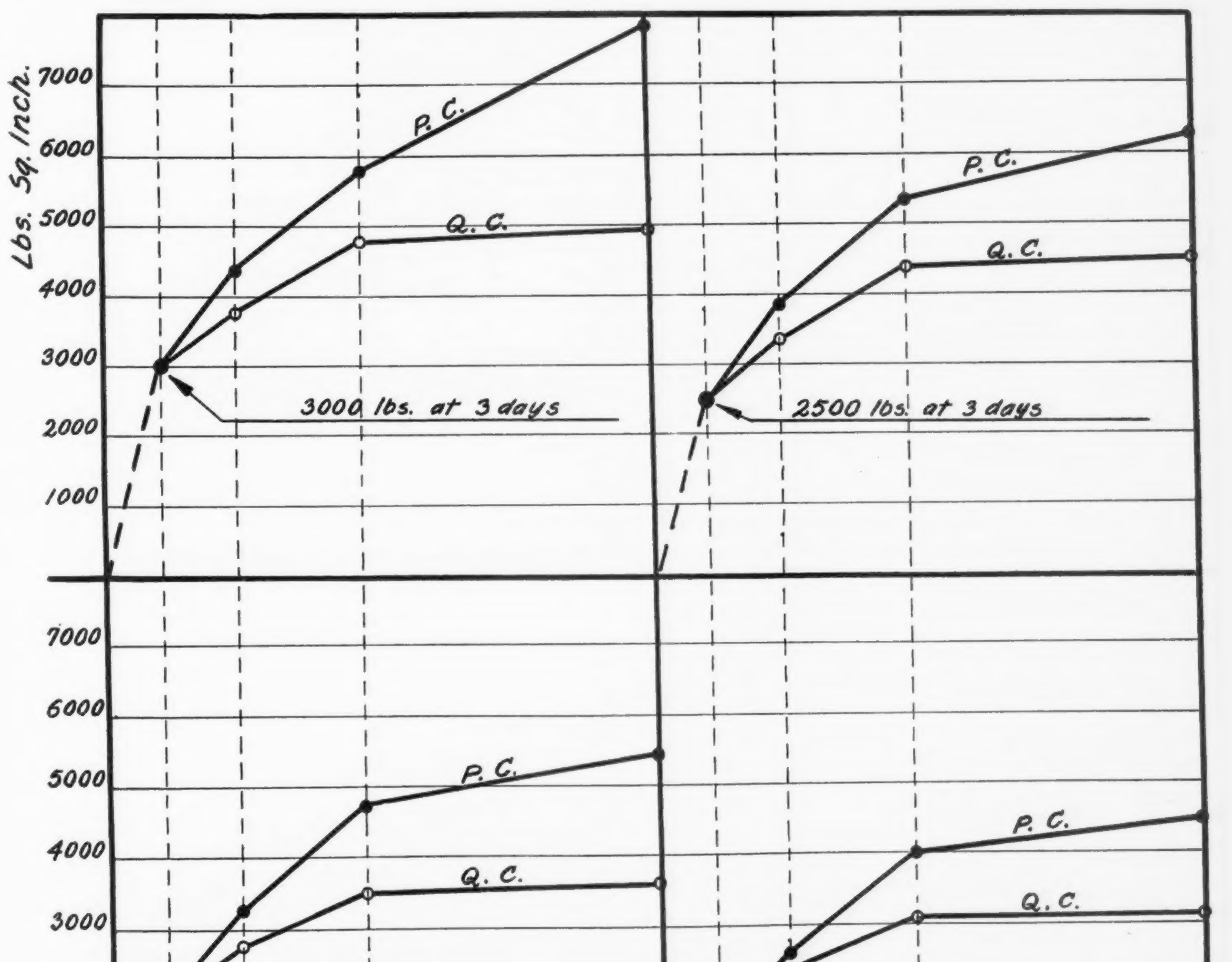


Diagram showing the progressive increase in compressive strength of high-early-strength concrete made with ordinary portland cement (P. C.), and with quick-hardening cement (Q. C.)

it is possible to make high-early-strength concrete with ordinary portland cement, and in a great number of cases calculations will show that the required early strength can be obtained cheaper by using ordinary portland cement.

The problem which confronts an engineer, who has to prepare the specifications for a job requiring high-early-strength concrete, is twofold: *Which mix will, for the least expenditure of money, give me the desired strength at the specified period,* and *What can I expect of this concrete at later periods.*

The first question is comparatively easy to answer, and, if necessary, the required proof may be obtained by actual tests in the course of a few days. But the second question is less readily answered by tests conducted on the job, and it may therefore have interest to investigate the relation between the progressive strengths of high-early-strength concrete made with an average grade portland cement and with a good quality quick-hardening cement of the portland cement type.

Comparison of Two Cements

As an example I will demonstrate the behavior of high-early-strength concrete made with two cements of the following physical characteristics:

	Portland cement	Quick-hardening cement
Fineness, 200-mesh	87%	95%
Setting time	3:00/6:00	3:20/8:00
Tensile strength, 1:3 Ottawa sand mortar.		
24 hr.	126 lb.	275 lb.
72 hr.	243 lb.	355 lb.
7 days	344 lb.	476 lb.
28 days	430 lb.	523 lb.

(The briquettes were kept in moist air for the first 24 hr., and in water for the remainder of the time.)

A series of concrete mixes was prepared with these two cements, and compressive tests were carried out under strictly uniform conditions. The results of these tests are shown below. Four cases have been investigated. In each case the mixes were designed to give *the same strength at 3 days each* with portland cement and with quick-hardening cement.

The 6x12-in. concrete cylinders of the various mixes were all stored in a moist-room at 70 deg. Three cylinders were tested at each period. The cylinders were tested in damp condition.

The continued increase in the strength of the portland cement concrete is most striking, and the trend of the curves indicates that the gap between the curves will continue to increase beyond the three months' period.

Examining the diagram of concrete having a three days' compressive strength of 2500 lb. per sq. in., we get the following figures:

	Compressive strength Lb. sq. in. P. C.	Q. C.
3 days	2500	2500
7 days	3850	3400
28 days	5350	4350
90 days	6250	4450

Editor's Note

As the old saying goes, "one swallow does not make spring"; or in this case the results of a comparison of two cements, one a standard portland, the other a high early strength portland, does not, to our mind, prove that all high-early-strength concretes if made of standard portland cement will prove superior to all such concretes made of high-early-strength cements. We have no more reason to believe that high-early-strength cements are uniform in their properties than "standard" portland cements, which we know are not.

This article by a well-known cement chemist is offered to readers of Rock Products not as propaganda addressed to users of cement, but as the result of a sincere effort of a cement manufacturer to find out the truth about at least one of the high-early-strength cements, now on the market.

That the issue is a very vital and touchy one to cement manufacturers is obvious, and it is difficult for them to regard it entirely dispassionately because of the inroads being made in the cement industry by high-early-strength cements. Yet they cannot safely be accused of any desire to fool themselves.—The Editor.

These figures leave no doubt as to which type of concrete gives the best insurance against unexpected stresses at later periods, and it is also reasonable to expect that the concrete which develops the highest ultimate strength carries within itself a greater volume of resistance towards any extraneous action tending to break down the strength of the concrete, such as the attack of sea water or other salty or alkaline waters which are notoriously injurious to the life of concrete.

Importance of the County as Highway Building Factor

THE counties of the United States improved 45,481 miles of local and county roads in 1929, and the total in the county road system now is 2,710,097 miles, according to reports to the Department of Agriculture, a summary of which was made public by the department August 10. The counties spent $807,714,604.

Approximately two-thirds of the improved roads were surfaced, but the mileage of earth roads is still nearly five times the mileage of surfaced roads, according to the statement.

The statement follows in full text:

A total of 45,481 miles of local and county roads, exclusive of state highways, were improved in 1929 by the counties of the 48 states, it is indicated by reports obtained from authorities of selected counties by the Bureau of Public Roads. These reports indicate a total of 2,710,097 miles of highway in the county road systems.

The reports indicate that all counties spent a total of $807,714,604 in the year for county and local road and bridge construction, including payments on bonds and transfers to state highway departments. It is estimated that available funds amounted to $953,529,592. An unexpended balance of $145,814,988 was on hand at the end of the year.

Of the total mileage improved in the year, the reports indicate 29,804 miles, or 66%, were surfaced, and 15,677 miles, or 34%, were graded and drained earth roads. The surfaced mileage includes 2905 miles of sand-clay and topsoil roads; 19,753 miles of gravel; 3666 miles of waterbound macadam; 2037 miles of bituminous macadam; 54 miles of sheet asphalt; 176 miles of bituminous concrete; 1191 miles of portland cement concrete, and 22 miles of brick and other block pavements.

The estimated total mileage in the county road systems includes 454,111 miles of surfaced highways, including 416,770 miles of low-type and 37,341 miles of high-type surfacings. The low-type surfacings include 75,547 miles of sand-clay and topsoil, 292,463 miles of gravel, and 48,760 miles of waterbound macadam. The high-type surfacings include 16,692 miles of bituminous macadam; 1539 miles of sheet asphalt; 4057 miles of bituminous concrete; 13,254 miles of portland cement concrete, and 1799 miles of brick and other block pavements.

The reports from the selected counties indicate that all the counties of the states spent $256,581,811 for construction; $260,-477,801 for maintenance, and $49,455,959 for miscellaneous items; that they paid out $78,277,070 for interest on outstanding bonds and notes and $106,032,780 in retirement of the principal on the bonds and notes, and transferred $56,889,183 to the states for work on state roads. The total disbursement is estimated to have been $807,714,604.

Canterbury Cathedral Keeps Out Cement Plant

FEAR THAT gases common to the vicinity of cement plant operations will threaten the durability of the time hallowed Canterbury cathedral has caused the town fathers of Canterbury, England, to withhold consent to the building of a cement works in the southern part of the city, according to *Quarry and Surveyors' and Contractors' Journal.* The writer of the article, however, says that without questioning the validity of the objections he cannot see how the nation can afford to preserve local amenities at the expense of new enterprise, especially in view of the industrial conditions.

Recent Japanese Research in Portland Cements

Reviewed for Rock Products

By William A. Ernst
Chief Chemist, South Dakota State Cement Plant, Rapid City, S. D.

STUDIES ON LAITANCE OF CEMENT MORTARS AND CONCRETE

By SHOICHIRO NAGAI and KOSUKE YOSHIZAWA

The first article on this subject was published in ROCK PRODUCTS, January 18, 1930, page 59.

The present paper deals with the results of studying the chemical composition of various laitances formed on cement-sand mortars, neat cement, etc., kneaded with water of various water-cement ratios. The relations between the compositions of laitance and water-cement ratios, admixtures or accelerators, etc., were studied and their results are briefly summarized as follows:

(1) Laitance formed on cement mortars of various water-cement ratios. Water-cement ratios were changed from 50% to 70% and the results of analysis of laitance formed on 1:2 cement-sand mortars were compared with the cements used. The result is shown in Table No. 9.

In this table it is clear that the increases of loss on ignition and lime with the increase of water-cement ratios show the formation of large amounts of calcium carbonate which is formed by carbon-dioxide in the air and calcium hydroxide produced by the hydration of the cement. The amounts of sulphur trioxide are considerably greater in the case of large water-cement ratios.

Chemical compositions of laitance on neat cement of various water-cement ratios were also studied. The results are very nearly equal to those in Table No. 9.

(2) Laitance on neat cement with admixtures or accelerators. The siliceous admixtures, as puzzolanas, siliceous earth (Keisanhakudo), etc., and calcareous admixtures and accelerators, as lime, calcium chloride, calcium oxychloride (as "Cal"), etc., were added to cements A and B and laitances were obtained and their chemical compositions were analyzed and the results tabulated in Table No. 10.

In these results, the laitances 4c, 5c, 4c' and 5c' contained remarkably large amounts of chlorine, and 6c and 6c' of sulphur trioxide.

This chlorine or sulphur trioxide was extracted by water, from the admixtures or accelerators above cited, as $CaCl_2$, "Cal" or gypsum. The amount of chlorine or sulphur trioxide increased considerably when the water-cement ratio was higher than 60 or 70%.—*Silicate Institute, Department of Applied Chemistry, Faculty of Engineering, Tokyo Imperial University.*

TABLE No. 9. CHEMICAL COMPOSITION OF LAITANCES FORMED ON 1:2 CEMENT-SAND MORTARS OF DIFFERENT WATER-CEMENT RATIOS

Series	No. of sample	Water cement ratio	Laitance air-dried: Loss on ignition	SiO₂	CaO	SO₃	Laitance ignited: SiO₂	CaO	SO₃
	Cement A	....%	0.89%	23.05%	63.15%	1.05%	23.86%	63.75%	1.06%
(1)	3b	50	26.31	29.51	35.94	2.12	40.08	48.80	2.88
	4b	60	32.67	12.31	44.79	2.87	18.28	66.52	4.26
	5b	70	34.35	10.01	43.55	3.05	15.24	66.32	4.60
	Cement B	....	0.57	20.97	64.82	1.44	21.09	65.21	1.45
(2)	3b'	50	23.67	34.43	35.22	1.98	45.13	46.18	2.60
	4b'	60	28.61	20.73	42.23	2.34	29.05	59.20	3.28
	5b'	70	33.27	16.21	43.13	3.12	24.30	64.68	4.68

TABLE No. 10

Series	No. of samples	Admixtures or accelerators		Laitance air-dried: Loss on ignition	Insol. residue	SiO₂	Al₂O₃+ Fe₂O₃	CaO	MgO	SO₃	Cl
(4)	Cement A			0.89%	0.82%	23.05%	9.74%	63.15%	1.55%	10.5%	0%
	1c	Siliceous earth	20%	42.12	2.97	11.22	4.88	37.07	1.22	2.08	0
	2c	Puzzolana	20	42.28	2.36	10.92	5.11	38.45	1.24	2.14	0
	3c	Lime	20	38.17	1.02	6.52	4.22	48.13	1.68	2.18	0
	4c	$CaCl_2$	5	39.68	0.99	7.16	4.85	40.28	1.27	1.56	6.12
	5c	"Cal"	5	39.54	1.07	8.43	4.00	41.27	1.25	1.48	2.08
	6c	Gypsum	5	40.45	1.29	8.88	3.37	39.43	1.29	8.08	0
(5)	Cement B................			0.57	0.77	20.97	9.13	64.82	1.40	1.44	0
	1c'	Siliceous earth	20	39.91	2.37	14.98	5.68	38.57	1.02	2.12	0
	2c'	Puzzolana	20	38.64	2.02	12.63	5.96	39.73	1.31	2.02	0
	3c'	Lime	20	36.12	0.87	7.68	5.78	47.87	1.37	1.98	0
	4c'	$CaCl_2$	5	36.24	0.89	10.47	6.12	42.54	1.56	2.01	5.38
	5c'	"Cal"	5	37.50	0.87	9.91	6.23	42.71	1.31	1.89	1.72
	6c'	Gypsum	5	36.40	1.07	9.74	5.84	41.43	1.23	7.25	0

STUDIES ON ACID-PROOF CEMENT MORTARS

By SHOICHIRO NAGAI and SUKU MATSUYAMA

In the present paper, the authors report the results of many comparative studies on physical tests. By these comparative studies some important points were observed relating to the properties and compositions of two component mortars.

The first, soluble sulphates, chlorides, etc., in the siliceous powder, are to be excluded to their traces, since they form on kneading them with alkali silicate solutions, alkali salts soluble in water or acid solution and disintegrate the mortars.

The second important point is the fineness of the siliceous powder. The fineness distribution or fineness modulus of the powders are to be in the proper state. Some parts of coarse sandy particles are necessary to the acid-proof cement mortars, which react as in the ordinary portland cement mortars.

The third point of importance is the content of silica in silicates of the alkali silicate solutions. The sodium silicate of large content of silica as $Na_2O{\cdot}3SiO_2$ or $Na_2O{\cdot}4SiO_2$ are better than those of small content of silica as $Na_2O{\cdot}2SiO_2$ or $Na_2{\cdot}SiO_2$.

The alkali silicate solution of the former silicates of large silica content harden the mortars very quickly and are much more resistible to mineral acids.

On the contrary, the silicate solution of the latter silicates of low silica content makes the mortars slow hardening, and the alkali combines with acids to soluble sulphate, chloride, nitrate, etc., which dissolve in water or acid solution and disintegrate the mortars. —*Applied Chemistry Department, Engineering Faculty, Tokyo Imperial University.*

STUDIES ON BENDING STRENGTH OF CEMENT MORTARS

By SHOICHIRO NAGAI

The author, in his previous studies (*The Journal of the Society of Chemical Industry*, Japan, 1927; **30**, 680-687; 1928; **31**, 1153-1158), studied the modulus of rupture of cement mortars and compared the relation

between tensile strength, compressive strength and modulus of rupture. Continuing the study on another testing method of strength of cement mortars, he reported in this paper the result of the bending strength or transverse strength of cement mortars by using seven portland cements, one blast-furnace-slag cement and one "Soliditit" cement recently made in Japan and one English rapid-hardening portland cement ("Ferrocrete") and one American high aluminous cement ("Lumnite"). The test pieces of these strength tests of tensile strength, compressive strength, modulus of rupture and bending strength were molded by using Steinbruch-Schmelzers mixer of cement mortars and Bohme's hammer apparatus and other details in Japanese standard specifications for portland cement.

The calculation formulas of modulus of rupture and bending strength are compared as follows:

Modulus of rupture:

$$R = \frac{M}{Z} = \frac{6LW}{bd^2} = \frac{6 \times 3 \times 50 \times W}{2.22 \times 2.25^2} = 80\,W \text{ kg./cm.}^2$$

In this formula b is breadth of test piece (2.22 cm.), d = depth (2.25 cm.), L = length of arm (3.0 cm.) and W is actual weight applied, equal to 1/50 of W kg.

Bending strength:

$$B = \frac{M'}{Z'} = \frac{3L'W'}{2b'd'^2} = \frac{3 \times 7.4 \times W'}{2 \times 2.25 \times 2.22^2} = W' \text{ kg./cm.}^2$$

in which b' ($= b$), is breadth of test piece (2.22 cm.), d' ($= d$) is depth (2.25 cm.), L' is distance between two supports (7.4 cm.) and W' is actual weight applied.—*Applied Chemistry Department, Engineering Faculty, Tokyo Imperial University.*

COMPOSITION OF INSOLUBLE RESIDUE OF VARIOUS CEMENTS

In the previous studies on lime, silica, molecular ratio and calcium silicate ratio of portland cements (*Journal of the Society of Chemical Industry*, Japan) and the relations of composition and strength of cement-mortars on combined hardening (the above *Journal*, 1929; **32**, 236 and 243; 1928, **31**, 821 and 941; 1929, **32**, **75** and 343 respectively) it was necessary to obtain the accurate amount of silica combining with lime.

Total silica or SiO_2-insoluble residue is in general adopted for this purpose by assuming the insoluble residue to silica. But the insoluble residue is a mixture of alkali alumino-silicate (feldspatic material), crystalline silica, etc., which are insoluble in hydrochloric acid.

From many portland cements of foreign and Japanese make, blast-furnace-slag cement, "Soliditit" cement and aluminous cement, samples of insoluble residue were obtained by very troublesome treatments, and their compositions were determined by the same methods of analysis of portland cement. Results are shown in Table No. 11.

TABLE No. 11. COMPOSITION OF INSOLUBLE RESIDUE OF VARIOUS CEMENTS

Sample of cement	Loss on ignition, Pct.	SiO_2 Pct.	Al_2O_3 Pct.	Fe_2O_3 Pct.	CaO Pct.	MgO Pct.	Diff. (R_2O_3, etc.) Pct.
Japanese portland cement No. 1	2.17	70.19	6.93	7.25	1.44	0.95	10.58
Japanese portland cement No. 2	2.15	76.08	7.79	2.78	0.69	1.16	9.37
Japanese portland cement No. 3	3.22	77.27	5.82	4.13	1.02	0.57	7.97
Foreign portland cement No. 4	4.68	80.08	4.93	1.36	1.03	1.91	7.01
Foreign portland cement No. 5	4.06	80.89	3.68	1.01	0.96	0.98	7.50
Foreign portland cement No. 6	2.33	81.46	5.19	2.01	0.97	0.70	7.34
Foreign portland cement No. 7	5.40	81.04	7.23	Trace	0.25	0.58	5.49
Aluminous cement No. 8	2.97	61.06	23.41	3.50	2.25	1.44	4.75
Blast-furnace-slag cement No. 9	7.21	74.71	3.68	2.32	0.29	0.76	11.03
"Soliditit" cement No. 10	1.55	75.25	8.04	3.16	2.28	1.61	8.10
"Soliditit" cement No. 11	1.32	73.74	7.70	8.49	1.53	0.62	6.60

From these results the principal compositions of ignited insoluble residue of portland cements are silica (average 80%), alumina and alkali, showing the mixture of alkali alumino-silicate and crystalline silica. The author adopted the factor 0.80 to insoluble residue to obtain the accurate amount of silica combining with lime as (SiO_2 — 0.80 × insol. res.) in the papers above cited.

The insoluble residue of the aluminous cement ("Lumnite") has the composition remarkably deviated, and the foreign portland cements Nos. 6 and 7 contained much insoluble residue, which composition is rich in silica.—*Institute of Inorganic Industrial Chemistry, Department of Applied Chemistry, Faculty of Engineering, Tokyo Imperial University.*

STUDIES ON ACID-PROOF CEMENT MORTARS

By SHOICHIRO NAGAI

In addition to the samples in the first paper (*Journal of the Society of Chemical Industry*, Japan, 1929; **32, 784**) many new samples of two components of acid-proof cements—the siliceous powder and alkali silicate solutions of known concentration—were examined on their physical properties and chemical compositions.

In the table Nos. 7, 8, 9 and 10 are commercial products in Japan and in Germany. No. 11 is a siliceous residue obtained in the extraction of alumina from calcined clay. Nos. 12, 13 and 14 are powders of natural siliceous rocks of lava or sandstone nature.

By kneading these siliceous powders with alkali solutions and molding to several specimens of acid-proof cement mortars, many tests on physical strength and chemical resistibility to strong acids will be tested by comparing with the results in the former papers.—*Institute of Applied Chemistry, Faculty of Engineering, Tokyo Imperial University.*

Cement in Sweden

THE LIVELY BUILDING program in Sweden is the chief reason for an increase in cement production in 1929 over previous years. The annual report of the Skanske Cement Aktiebolaget, which enjoys a practical monopoly of cement production in southern Sweden, shows that the principal factories at Limhamn and Hellekis were kept at full production during the year.

At Linhamn 1,071,247 bbl. were produced, and at Hellekis production amounted to 318,883 bbl., making a total of 1,389,130 bbl., of which 395,914 were exported.

CHEMICAL COMPOSITIONS OF SILICEOUS POWDERS

No. of sample	Loss on ignition Pct.	Insol. residue Pct.	Silica Pct.	Alumina Pct.	Ferric oxide Pct.	Lime Pct.	Magnesia Pct.	Sulphur trioxide Pct.	Chlorine Pct.
No. 7	0.10	97.37	71.08	20.32	4.85	3.27	1.17	0.22	0.05
No. 8	0.16	97.63	92.23	1.12	0.13	0	0.12	0.01	0.05
No. 9	4.86	39.19	57.75	12.19	1.52	18.67	3.17	1.04	0.15
No. 10	0.34	97.38	82.34	1.76	0.57	1.77	0.17	0.47	0.10
No. 11	1.55	89.84	89.84	33.83	0.15	0.38	0.26	0.19	0
No. 12	3.10	86.93	63.53	15.39	4.44	6.97	2.80	0.07	0
No. 13	0.77	95.51	73.93	13.08	1.72	1.33	0.68	0.10	0
No. 14	1.92	91.16	74.89	16.91	1.63	1.00	0.08	0	0.06

PHYSICAL PROPERTIES OF ALKALI SILICATE SOLUTION

No. of sample	Density		Relative viscosity	
		Bé.	To glycerine (100)	To caster oil (100)
No. 3	1.345	37 deg.	6.81	4.59
No. 4	1.345	37 deg.	5.12	3.45
No. 5	1.277	31.2 deg.	4.52	3.04
No. 6	1.277	31.2 deg.	2.74	1.85

CHEMICAL COMPOSITIONS OF ALKALI SILICATE SOLUTIONS

No. of sample	Water Pct.	Silica Pct.	Alumina and ferric oxide Pct.	Lime and magnesia Pct.	Alkali Pct.	Sulphur trioxide Pct.	Chlorine Pct.	Molar ratio of silica to alkali Pct.
No. 3	66.81	25.61	0.31	0.35	6.78	0.04	0.10	3.91
No. 4	65.86	23.94	0.10	0.34	9.60	0.11	0.11	2.55
No. 5	70.74	22.14	0.28	0.36	6.16	Trace	0.07	3.73
No. 6	70.86	21.50	0.04	0.41	6.40	0.33	0.10	3.47

Lime Burning With Natural Gas

One Plant in Ohio Has Used Natural Gas Practically Continuously for Thirty Years

IN THAT CLASSIC WORK, "Limestones and Lime Industry of Ohio," by Orton and Peppel, which for many years was practically the only comprehensive treatise on the technology of lime manufacture, and still is a valuable source of information, the following paragraphs occur:

"Natural gas was employed widely for a few years—1884 to 1890—but it soon became apparent that if gas were applied to such crude purposes there would be but little left of the local supplies for the more profitable uses of cooking and heating in homes and business buildings. In 1901, one lime plant in Springfield was still using natural gas, but [written in 1905] has since ceased. While natural gas is an ideal fuel for this or any purpose, it is certainly true that nothing but wasteful, almost criminal, extravagance would permit its use for burning lime. . . . The natural gas supply should be preserved for domestic uses only. Within the last few years the supply from some of the largest gas fields of southeastern Ohio and West Virginia have been piped through to Toledo, passing through some of the lime territory. A few lime manufacturers have taken advantage of the availability of this gas for lime burning, although they realize that if it is used for all purposes they can have it for a few years at most and must eventually go back to coal as their fuel. In 1905, one plant at Marion, one at Fostoria and one at Tiffin were using natural gas.

"The plants using natural gas show a slightly higher fuel cost than those using coal, but the total cost per ton of lime produced and marketed is about the same, the labor saving with gas taking care of the small additional first cost of fuel. These plants will undoubtedly fall back on coal again in a short period of time."

As a matter of fact most of the plants did fall back again on coal, for one reason or another, but the one at Springfield, after using coal (producer gas) for a while returned to the use of natural gas, and has used it practically continuously ever since.

Remembering that Peppel was a geologist, one can understand his abhorrence of the use of natural gas for lime burning, particularly the natural gas then found in Ohio, which was in relatively small pockets, quickly exhausted. But times have changed and natural gas is being produced in tremendous quantities in the Oklahoma, Kansas and Texas oil fields, in quantities far in excess of any possibility of local consumption. As every one who reads newspapers knows, pipe lines thousands of miles long are making this gas available for use throughout all of the Central States—36 of the 48 states to be exact.

According to the *Business Week*, which recently made an investigation of the subject:

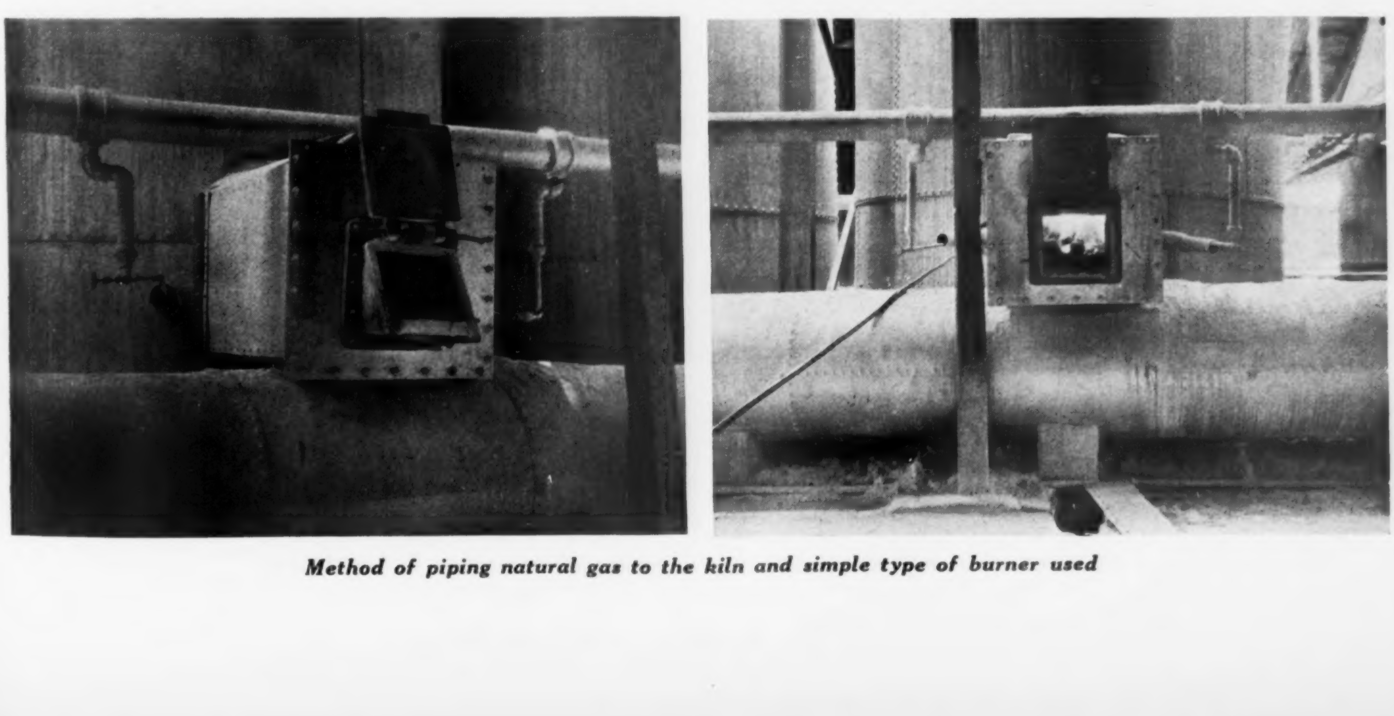
"(1) Industry will supply the big market. Natural gas is to be the industrial fuel in all parts of the country except the North Atlantic and Pacific Northwestern states. (2) Natural gas will never figure prominently as a boiler fuel in power plants except within 200 miles of the gas fields. (3) Natural gas will never displace artificial as a domestic cooking and heating fuel except in the few cities where cheap blast furnace gas can be mixed with the natural. Rates for cooking gas will not be reduced materially. Few towns now using the artificial can hope to get the natural for cooking at rates lower than those they now pay. (4) Natural gas will not be sold cheaply enough to permit its general use as a house heating fuel except in the South near the sources of supply. From the replies of potential users of natural gas it is evident that industry can afford to pay from 25 to 35 cents per 1000 cu. ft.; the householder about twice that. Possibly the latter could go as high as 75 cents but no further. Power plants, it appears, cannot justify any price over 19 cents."

Under those conditions lime manufacturers should surely be interested in the experience of the Ohio lime manufacturer who has used natural gas for so long. Accordingly one of the editors recently spent several days studying this operation, and his report follows:

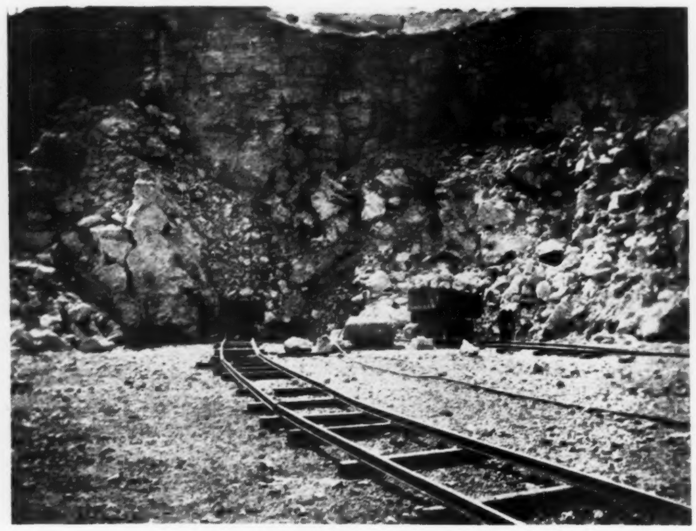
Objections to Natural Gas for Burning Finishing Lime

A few lime manufacturers, particularly in the Woodville district, have been trying out natural gas again to some extent during the past couple of years, but the results seemed to them less satisfactory than when using the other usual methods of burning with coal, so that they have either abandoned the method or are about to do so. The particular objection seemed to be the difficulty of tempering the flame and holding the temperature down sufficiently, as well as an apparently greater cost of this fuel as against coal.

The dolomitic lime in this district requires soft burning and not too high temperatures, if a high grade finishing hydrate is to be produced, or at least the experience of the



Method of piping natural gas to the kiln and simple type of burner used



Two scenes in the Moores Lime Co. quarry where stone is loaded on a per ton basis

manufacturers has been that a lime which is hard burned will not make a satisfactory hydrate; and it was found to be rather difficult to obtain the desired soft burning at low temperatures and maintain also a uniform control of the temperature when using natural gas.

It is generally considered that the most desirable flame for lime burning is one of moderate intensity and large volume, such as is obtained in wood-fired kilns, and to a slightly less extent perhaps in kilns fired with producer gas. In burning with natural gas (or with oil) the flame is liable to be more intense and shorter and less expanded, so that in the cases mentioned steam was used to temper the flame, and water atomization was also tried, but in spite of the efforts made the results did not, from the standpoint of the lime manufacturers, seem to justify the method.

Moores Lime Co. Operation

However, at one of the plants further downstate, the Moores Lime Co. near Springfield, Ohio, with a dolomitic limestone, but not producing a finishing hydrate, natural gas has been used for quite a long time and is preferred to producer gas or direct coal firing. In fact, a gas producer was installed a number of years ago, operated for a time, and then discontinued in favor of the natural gas again.

So that at this plant, producing both quicklime and hydrate mostly for chemical purposes, but not a finishing hydrate, natural gas firing is preferred to other methods, although the actual direct fuel cost would seem to be higher than with coal or producer gas from coal, as ordinarily considered and computed. However, a satisfactory product is obtained and when all the factors are taken into consideration it may not after all be any more expensive than coal. When kilns are hand fired with coal more labor is necessary for firing and handling coal and ashes, and in the case of producer gas installations more investment is tied up, while with natural gas these items are a minimum. Under coal firing where the fuel item may be taken as around $1.75 per ton of lime and the labor item as $0.75 per ton, or $2.50 per ton of lime for both, the cost of natural gas fuel would not exceed $2.25 per ton of lime, and the labor in connection with gas firing is very little, so that under certain conditions natural gas firing is not necessarily any higher than coal.

About this operation there are a number of things worth considering, the result apparently of a certain independence of thought and action, and a way of analyzing each problem perhaps a little more than is usually done, all without detriment to the effectiveness of the operation. It is not a large operation, about 80 to 90 tons of lime per day, and it is carried on a little differently from most plants of its kind. The burning is done in two units of four kilns each, about 1500 ft. apart, one unit making both pebble and pulverized quicklime and also hydrate, while at the other some special quicklime products are made.

No Special Burners Required

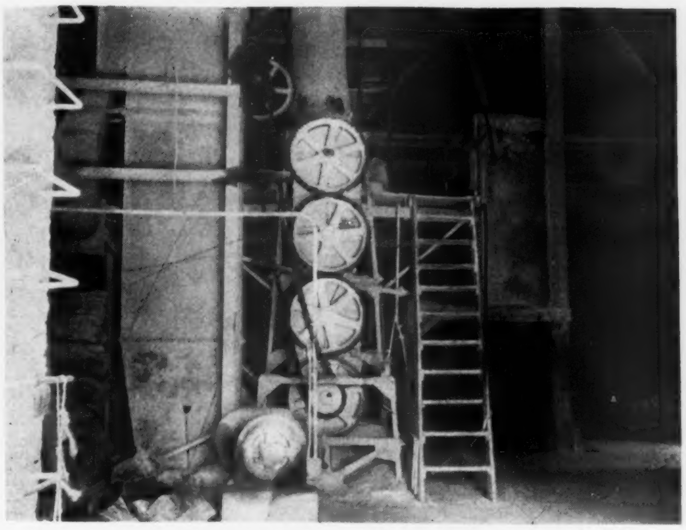
At both plants natural gas at a pressure of about 2 lb. per sq. in. is used for burning, with the simplest kind of burners, or rather no special burners at all, as they are simply small pipes inserted into 3-in. or 4-in. pipes projecting through the kiln lining. Four burners are used on each kiln, each pair of burners separated by an inspection and poking door on opposite sides, so that they are well separated but not equally divided around the kiln—very little supervision of the burning is necessary, one man at each plant taking care of the burning and drawing of the kilns as well as handling the lump lime to the crushers. This work is done on a piecerate or tonnage basis.

On the burning, a chart record is kept of the gas pressure, which is of considerable

View from the quarry toward one of the kiln units

Front view of a Moores Lime Co. plant, Springfield, Ohio

help in checking up on the way in which the burning is carried on, particularly on the night shift, since any negligence in proper burning and drawing resulting in increased gas consumption will show up on the chart. Another important precaution in connection with the gas burning is the sampling and testing of the gas, as often as necessary, to check up on its B.t.u. It is apparent that if one is buying gas which is supposed to have 1000 B.t.u. per cu. ft., and it actually contains at times only 800 B.t.u.'s, or less, then more cubic feet at more cost is going to be necessary to do any given amount of burning. About 5000 cu. ft. of gas at 8-oz. pressure are normally used per ton of lime. Contrary to practice elsewhere, no steam is used with the gas, and there are no steam boilers around the plant.



Hydrator in Moores lime plant

Plant Details

At the plant making special products, the lime drawn from the kilns is wheeled to an 18-in. by 24-in. Jeffrey pulverizer, then carried up in an enclosed bucket elevator to a Sturtevant "moto-vibro" screen and loaded into cars from a spout by a short movable belt conveyor loader. Motors aggregating 30 hp. drive this equipment, and one man who works on a per ton basis carries on the whole operation. Thus this part of the work would seem to be on a quite simple and economical basis.

At the other plant, producing quicklime in both pebble and pulverized form, as well as hydrated lime, the four kilns are handled in the same way, one man looking after the burning and drawing and wheeling the lump lime to a Sturtevant rotary crusher. From the crusher the lime falls into the boot of a steel cased bucket elevator, which carries it up to a point from which it is either spouted to a bin for hydrating or is conveyed to a Hum-mer vibrating screen and Sturtevant hammer mill used in the production of pebble and pulverized quicklime. The elevator drive has been recently changed to include a Nuttal geared speed reducer in connection with a 10-hp. General Electric motor, which arrangement works out much better than the previous drive. The Sturtevant crusher is driven by a 20-hp. motor, and the screw conveyor by one of 5-hp.

In the production of pebble lime and pulverized lime the oversize from the Hum-mer screen is spouted back to the hammer mill and again elevated and put over the screen in closed circuit, the finished sizes falling to steel bins below. The pebble lime is loaded into box cars by means of a spout from the bin, while the pulverized lime is carried over from its bin in a small screw conveyor and spouted into the car. A small portable pulley type box car loader is used, consisting of a hopper and very short fast moving belt conveyor, which throws the material to the ends of the car. The pulverized product is also shipped in paper bags which are filled on a 2-tube Bates valve-bag packer driven by a 7½-hp. motor.

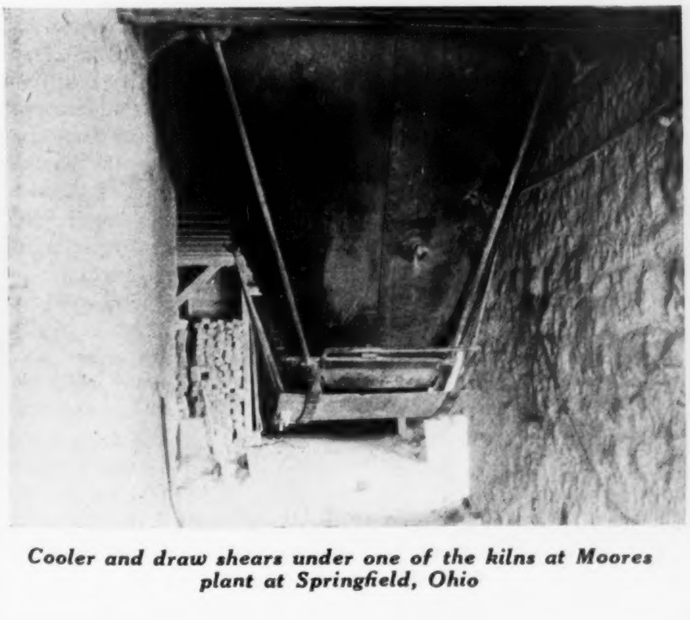
Hydrating Plant

The hydrating is done in a 6-drum Kritzer hydrator driven by a 20-hp. motor through a Palmer-Bee speed reducer, and is finished and put into a steel bin over the packer by a Raymond air separation system consisting of a pulverizer, separator, fan and collector, with 35 hp. of motors. Part of the hydrated lime is packed in 50-lb. paper bags on a 4-tube Bates packer driven by a 5-hp. motor, and some is also loaded in box cars in bulk in a quite simple way through a 3-in. pipe from the bin to the car, using compressed air to move it. A small air line with a valve is connected into the larger pipe in the direction of travel of the material at the bend where it leaves the bin bottom and runs horizontally toward the car door, and just enough air is admitted to move the material.

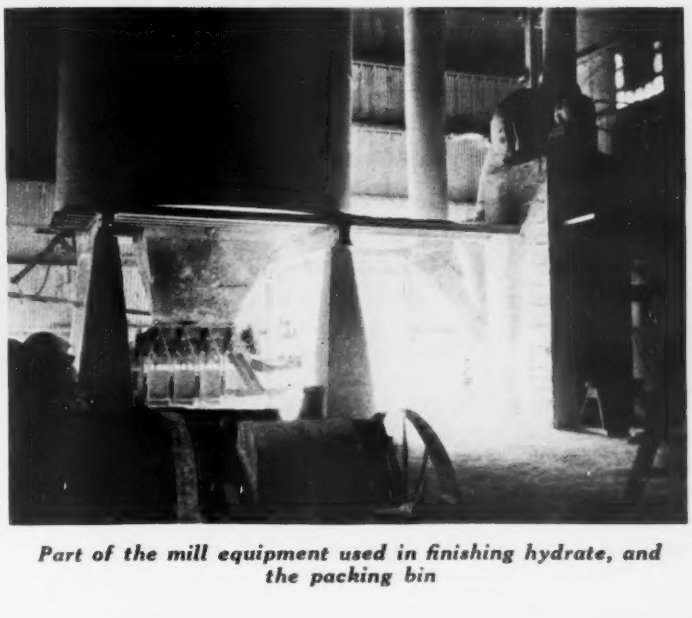
Two to three men are used on the packing and loading. At this part of the plant about 125 hp. of motors are connected up, only about 70 hp. being normally used during the daytime on the crushing and handling operations, and 55 hp. on hydrating at night. Hydrating, however, is not a continuous operation and at the present time is carried on only about 5 or 6 nights per month, most of the product going out as quicklime.

All motors but one are General Electric, high-torque, squirrel-cage type, operating on 3-phase 60-cycle 440-volt current. A 60-hp. General Electric motor, driving a Sullivan air compressor, is the only other electric power equipment used, and brings the total connected motor load up to 215 hp.

The maximum demand upon which the readiness-to-serve charge is made by the power company is 65 kw., which is somewhat



Cooler and draw shears under one of the kilns at Moores plant at Springfield, Ohio



Part of the mill equipment used in finishing hydrate, and the packing bin

above the present peaks. Hydrating at night rather than in the daytime keeps this demand charge from being any higher, and it is planned to reduce the demand to about 50 kw. by installing an automatic relay arrangement connected with the unloading device on the air compressor, so that the air compressor will be cut out during peak loads. Such reduction of the peak demand is of mutual advantage to both the lime company and the power company since the power lines are now fully loaded and would have to be constructed heavier if higher power demands were not guarded against, and by such planning the electrical service charge is kept down and the power costs reduced.

In the same way the cost of new construction from time to time is kept down through a study of the requirements.

Quarry Operation

Quarry loading of the kiln stone is done by hand on a contract basis of so much per ton, each car being weighed in the quarry. In this way a record is kept of each car loaded and to which kiln it went, thus providing a check on the output of each kiln. Besides the hand contract loaders, four men are ordinarily used in the quarry on day work for shooting, track work, etc. A small Plymouth gasoline locomotive is used to handle the cars between quarry and kiln inclines.

Stripping is done as required or expedient by a small Fordson tractor shovel rig loading to dump trucks. With this rig and two trucks three men are able to move about 275 cu. yd. of stripping per day at quite low cost.

Unusual Water Supply

The water system is interesting and unusual, as no pumps are used. Instead, water is raised from a well by an air lift to a storage tank alongside the compressor house and from this tank it flows by gravity to the mill and hydrator. In order to supply the shovel and well drill water is run from this storage tank into a smaller closed tank and then air pressure admitted to force it to the upper levels.

John Moores is president and superintendent and William H. Moores, secretary, treasurer and general manager, and to them belongs a great deal of credit for the ingenuity displayed throughout the operation.

Hydrogen Ion Measurements or pH Values

A 48-PAGE booklet giving much interesting and helpful information on the subject of hydrogen ion measurements has been published by Leeds and Northrup Co., manufacturers of electrical measuring instruments.

The first part of the booklet is given over to an explanation, which is unusually clear and comprehensive, of the meaning of hydrogen ion concentration and pH value, and of the principles involved in this now much used electrical method of measuring the acidity and aklalinity of water solutions.

Following is a description of the hydrogen and calomel electrodes used in the measuring process and the potentiometer equipment and connections used in measuring the difference of potential which indicates the amount of hydrogen ion concentration or the acidity of the solution. The use of the quinhydrone electrode and indicator for certain acid solutions is also explained.

Separation of Solids from Liquids

THE METHODS of separating solids from liquids may be divided into six groups, according to an article in British *Chemistry and Industry*. These are:

1. Gravity, or sedimentation.
2. Centrifugal (which may be regarded as an artificially intensified development of No. 1).
3. Filtration by percolation or obstruction.
4. Evaporation.
5. Evaporating and drying, combined or in co-operation.
6. Electric and magnetic deposition.

The last is said to be in a state of development, although it has been commercially applied in the rubber industry. In the rock products industry an electric method (cataphoresis) has been tried experimentally for reducing water content of cement slurries.

The other groups are all used in the rock products industry, the first, sedimentation, being the ordinary method of washing and recovering sand. The centrifugal method has found an important application in the making of synthetic gypsum, for unless the crystals are centrifuged the gypsum produced is of little value. Filtration by percolation is the method used for washing gravel and stone in screens. Filtration by obstruction (through a canvas or similar medium) is becoming increasingly important in cement making, especially where slag is used as the raw material. Evaporation, especially combined with drying, is used in many branches of the industry, silica sand, ground limestone and phosphate rock being dried in that way.

The article referred to contains 15 pages describing various machines used to separate solids from liquids. Many of them are for processes not found in the rock products field. Others are devices so familiar that they need not be described here. Hence what follows will describe only those which are novel in the industry or those which might be borrowed from other industries.

Among the sedimenting devices there is one, made by the Krupp Works, in Germany, which does not seem to be known in this country. It consists of a series of wedge shaped boxes, either with or without rising currents, with baffles of grating placed across the current. The grates set up eddy currents which cause the particles caught in the vortices to settle. Another interesting device is a mechanically operated classifier made by Waller and Son, Gloucester, England. It has an inner and an outer tank, both supplied with outlets for allowing solids to escape. In the inner tank is a propeller which acts as a pump to produce a rising current. The overflow from this goes to the outer tank in which the light solids settle and are discharged, the heavier solids being discharged from the inner tank. The water used overflows to a settling tank in which the finest solids are settled and then is pumped back to the inner tank to be used over again. As the speed of the propellor may be varied, the separation may be closely controlled. Working on coke ashes and cinders, the machine has produced clean coke for burning, cinders and breeze, the last two being used in making concrete products.

Filters of the disk and drum type and various modifications of the filter press are described at some length in the article; also a novel filter which has not yet had any use in the rock products industry. This is the "stream line" filter, made by Stream-Line Filter Ltd., London. The device has a series of non-porous paper disks with holes in the center through which a perforated pipe passes. The top and bottom of the pile of disks is tightly clamped to press the disks together, but the liquid finds its way between them when suction is applied to the perforated pipe. It is said that the solids never pass the edges of the paper disks so that the filter may be easily and quickly cleaned by reversing the flow. Another interesting filter is the "metafilter" made by A. Gallenkamp and Co., London. This has a series of thin metal disks which are clamped together to form a number of wedged shaped cells. The cells are first pumped full of some filtering medium, such as fine sand, and then filtering proceeds until the filter is clogged. Then the flow is reversed, washing out the filter medium. Clean medium is pumped in and filtering proceeds again.

Most of the dryers described are of the ordinary kiln type so much used in the rock products industry or the drum type, on which the material to be dried is sprayed. A new form of spray dryer described appears novel, the material being sprayed from below on an inverted saucer. Currents of hot and cold air are so directed as to prevent clogging. It is made by the Kestner Evaporator and Engineering Co., London. A dryer which has been used in the rock products industry in a crude "home made" form is made as a commercial machine by F. Weinrub, London. It can be used on any material that can be conveyed pneumatically. Air is preheated in a furnace and then blown through a long tube into which the material to be dried is fed. The hot air current conveys the material as it dries it and finally deposits it in a cyclone which catches all but the lighter solids. These are removed in a dust collector of the filter type and the air goes back to the furnace to be used over again, thus saving heat.

Use of Powdered Coal and Crude Oil in the Rotary Cement Kiln

Some Comparative Experiences and Some Conclusions About Kiln Operators

By Alton J. Blank

General Superintendent and Supervising Chemist, Compania de Cemento Portland "Landa," S. A., Puebla, Puebla, Mexico

THE BURNING of portland cement clinker in the rotary kiln is accomplished by use of powdered coal, fuel oil, or gas.

The cement works employing powdered coal as fuel constitute a majority, and this is accounted for in that the greater number of works are situated near this fuel source, this being particularly true east of the Mississippi river in the United States, as well as in Canada, England, Germany and other great cement producing countries of the world.

The number of cement works employing crude oil ranks second, and these works are usually situated at some distance from a coal supply, and generally adjacent to oil fields, this being particularly true in the middle and far western sections of the United States, in Mexico (where the coal available is of a low-volatile, high-ash composition), and to some extent in South America, though some of the European countries utilize crude oil to a lesser extent.

The use of gas in cement works is confined to those works situated in the gas belt in the middle-western part of the United States, although a few plants have made a study of the possibilities of utilizing artificial gas.

While the majority of cement works utilizes powdered coal as fuel, it has not been proven that this means of burning portland cement clinker is the most economical. (The fact that the initial large outlay of money necessary for the purchase and installation of machinery required in the preparation of powdered coal, together with the cost of preparation, which is in itself large, should, however, be taken into consideration where both coal and oil are available as fuel, inasmuch as the storage and preparation of fuel oil is a comparatively small item.)

While there are certain advantages claimed for the use both of powdered coal and of crude oil, there are also certain disadvantages had in connection with the use of either fuel.

Theoretically, it seems entirely plausible that in the operation of two kilns of equal diameter and length, utilizing the same raw materials, with kiln operating conditions of a sameness, one kiln being fired with powdered coal, the other with fuel oil, identical results should be obtained from each kiln in so far as output and fuel consumption in terms of B.t.u.'s are concerned.

Practically, it is doubtful whether the above identical results would be received, though any great difference in the results obtained from the operation of either kiln could possibly be traced, in part, to the human element in the kilns' operation.

Editor's Note

PERFORMANCE RECORDS are always interesting and valuable. With the author we doubt if those given in this article are really comparable — nevertheless, they help in arriving at the author's reflections on kiln-burning practice.—The Editor.

Experience by the writer in cement works employing powdered coal, and in works where fuel oil is used, together with data compiled at other works, resulted in the following statistics, which may be used as a basis of comparison. These data are as follows:

CEMENT PLANT No. 1—DRY PROCESS

Kilns in service—6 ft. by 60 ft.
Kind of fuel used—Powdered coal.
Heating value of fuel—13,750 B.t.u. per lb.
Average output per hour—8.3 bbl. clinker (376 lb.).
Average output per day—200 bbl. clinker.
Average coal consumption per bbl. clinker output—97.5 lb.
Average B.t.u. consumption per bbl. clinker output—1,340,625.
Average chemical composition of cement produced:

Ingredient	Chemical analysis
SiO_2	20.22%
Al_2O_3	7.52
Fe_2O_3	3.46
CaO	62.53
MgO	3.07
SO_3	1.74
Loss	1.20

CEMENT PLANT No. 1A—DRY PROCESS

Kilns in service—6 ft. by 60 ft.
Kind of fuel used—Crude oil.
Heating value of fuel—18,195 B.t.u. per lb.
Average output per hour—9.6 bbl. clinker (376 lb.).
Average output per day—230 bbl. clinker.
Average oil consumption per bbl. clinker output—95.92 lb.
Average B.t.u. consumption per bbl. clinker output—1,745,264.
Average chemical composition of cement produced:

Ingredient	Chemical analysis
SiO_2	21.54%
Al_2O_3	6.76
Fe_2O_3	2.84
CaO	62.62
MgO	2.24
SO_3	1.98
Loss	1.40

CEMENT PLANT No. 2—DRY PROCESS

Kilns in service—10 ft. by 150 ft.
Kind of fuel used—Powdered coal.
Heating value of fuel—12,150 B.t.u. per lb.
Average output per hour—57 bbl. clinker (376 lb.).
Average output per day—1368 bbl. clinker.
Average coal consumption per bbl. clinker produced—133.0 lb.
Average B.t.u. consumption per bbl. clinker output—1,615,950.
Average chemical analysis of cement produced:

Ingredient	Chemical analysis
SiO_2	20.86%
Al_2O_3	6.53
Fe_2O_3	2.35
CaO	62.23
MgO	3.24
SO_3	1.78
Loss	2.38

CEMENT PLANT No. 2A—DRY PROCESS

Kilns in service—10 ft. by 150 ft.
Kind of fuel used—Crude oil.
Heating value of fuel—18,000 B.t.u. per lb.
Average output per hour—41 bbl. clinker (376 lb.).
Average output per day—984 bbl. clinker.
Average oil consumption per bbl. clinker output—67.38 lb.
Average B.t.u. consumption per bbl. clinker output—1,212,840.
Average chemical analysis of cement produced:

Ingredient	Chemical analysis
SiO_2	20.28%
Al_2O_3	6.62
Fe_2O_3	3.08
CaO	62.34
MgO	2.14
SO_3	1.92
Loss	1.80
Alk.	1.68

CEMENT PLANT No. 3—WET PROCESS

Kilns in service—9 ft. by 8 ft. by 220 ft.
Kind of fuel used—Powdered coal.
Heating value of fuel—11,000 B.t.u. per lb.
Average output per hour—49.4 bbl. clinker (376 lb.).
Average output per day—1186 bbl. clinker.
Average coal consumption per bbl. clinker output—155 lb.

Average B.t.u. consumption per bbl. clinker output—1,605,000.
Average chemical composition of cement produced:

Ingredient	Chemical analysis
SiO_2	20.68%
Al_2O_3	6.19
Fe_2O_3	3.85
CaO	63.15
MgO	3.05
SO_3	1.64
Loss	0.86

CEMENT PLANT No. 3A—WET PROCESS

Kilns in service—9 ft. by 8 ft. by 220 ft.
Kind of fuel used—Crude oil.
Heating value of fuel—18,300 B.t.u. per lb.
Average output per hour—44.9 bbl. clinker (376 lb.).
Average output per day—1078 bbl. clinker.
Average oil consumption per bbl. clinker output—92.55 lb.
Average B.t.u. consumption per bbl. clinker output—1,693,665.
Average chemical composition of cement produced:

Ingredient	Chemical analysis
SiO_2	19.94%
Al_2O_3	8.28
Fe_2O_3	3.78
CaO	63.64
MgO	1.09
SO_3	1.97
Loss	1.12

Other data concerning the fuel consumption and clinker outputs could be given on a larger number of kilns, but it is unnecessary, inasmuch as these data are given only for what they may be worth to the reader, and it is to be expected that any conclusions may be drawn from the examples shown.

Perusal of these data show the coal-fired kilns, with one exception, to give the higher clinker outputs; and they show the oil-fired kilns, with one exception, to give the higher fuel consumptions per barrel of clinker output, in terms of B.t.u.'s.

However, the wide variation in the composition of the finished cements made in the different plants will account in part for the difference in the fuel consumptions and kiln outputs. To a greater extent this may be accounted for in the different types of kiln operators to be found in any plant.

Importance of Kiln Operator

In the writer's opinion, those kiln operators to be found in cement works utilizing crude oil as fuel are comparatively inferior to those to be found in cement works utilizing coal as fuel, this being particularly true in cement plants situated outside the United States, where few experienced kiln operators are to be found. Incidentally, while on the subject of kiln operators it may be stated that the kiln operator plays a more important part than any other man in the operating department of a cement plant. Inasmuch as the kiln fuel item composes one-fourth to one-half of the total cost of portland cement manufacture, and whereas the daily output of clinker, the consumption of fuel, and the quality of the product all depend entirely upon the care exercised by the kiln operator, this assertion is readily appreciated. Therefore, an experienced, conscientious kiln operator is in a position to save his company more money than any other workman connected with the plant's operation; and this man should be compensated for his services accordingly.

Returning to the coal- and oil-fired kilns, the writer, through use of the optical pyrometer, has found the flame temperature in oil-fired kilns to greatly exceed that temperature to be found in coal-fired kilns. This difference has usually been found to average 200 to 300 deg. F. higher in the oil-fired kilns. It is generally understood that the life of refractory linings in coal-fired kilns is greater than that in oil-fired kilns, and this assumption is correct in so far as the writer's experience is concerned.

In cement plant No. 2 (dry process) the writer has seen the normal 65-75% alumina refractory kiln brick last less than six months in the kiln burning zones. Incidentally, the life of this same refractory type brick was comparable in the kilns of cement plant No. 2A (dry process). However, the cause of the early failure of the kiln linings in both instances was traceable directly to inefficient, inexperienced kiln operators.

In later installations of high-alumina refractory brick in the kilns of cement plant No. 2 (dry process) the average life of the liners exceeded 12 months. Later installations of the same type refractory brick in the kilns of cement plant No. 2A (dry process) have had an average life of nine months.

In cement plant No. 1 (dry process) the average life of normal silica brick in the burning zone of the kilns is three months, while in cement plant No. 1A (dry process) the life of high-alumina kiln brick has been as low as two months, with an average of little more than three months. However, in the former plant efficient kiln operators are had, while in the latter plant inexperienced, inefficient kiln operators are had.

In view of the fact that the temperature of the oil flame is usually higher than that of the coal flame, it is to be expected that earlier failures will be had in the refractory linings of oil-fired kilns. However, in view of the fact that an oil-fired kiln requires greater attention than a coal-fired kiln, good kiln operators in either case can reduce the lining failure to a minimum. With due consideration to the fact that cement plants employ either coal or oil as fuel, it may be stated that 50% of early failures of kiln linings may be traced directly to the human element in the kiln operation. A poorly paid kiln operator may turn out to be the most expensive employe in the plant.

Moving Picture Study of Sand Falling in Water

WALDEMAR A. GOOSKOV, professor at the Ekaterinoslav, Russia, Mining Institute, has used a moving picture camera to study the fall of grains in still water and gives some results of his study in Technical Publication No. 18 of the American Institute of Mining and Metallurgical Engineers. The apparatus was a tall tube filled with water into which the grains were placed. This was mounted on a scale of millimeters which photographed with the tube. Photographs were taken at half-second intervals for the seconds.

Mr. Gooskov is in a coal mining region and his experiments were directed toward the design of jigs for use in separating coal from schist and pyrite. The material tested contained grains of these along with a little clay that adhered to the grains. As the mass fell through the water it separated into three zones, a top zone of clay, an intermediate zone of coal and a bottom zone of schist and pyrite, the separation into zones being due to the differences in falling rates. The separation showed quite plainly in the photographs and by drawing lines through the points of separation on a series of the pictures, diagrams which represented the rate of fall and the width of the zones were made. The widest zone was that of the pyrite and schist, for the pyrite was heavier than the schist and separated from it in the same way that the schist separated from the coal.

The grain sizes were coarser than those usually investigated for falling rates. They varied from 1/16-in. to ½-in. in diameter and were classed in six groups for testing. All fell according to the Rittinger formula, $v = C\sqrt{D(\delta - 1)}$, and a purpose of the investigation was to find a value for C.

The photographs showed that: (1) In the first part of the fall the velocity was less than normal. (2) After falling ½ sec. to 1 sec. a constant velocity of fall seemed to be maintained. (3) Mixed grains of various specific gravities in attaining their constant velocity gave a zone of width varying with the quantity present. (4) For each size of grain photographed there is a separate diagram showing a greater constant velocity the greater the diameter of the grain.

While these conclusions are like those drawn from visual observation, the author of the paper rightly recommends the use of the movie camera for studying falling rates to eliminate entirely the faults of human observation. He compares the results of his tests with those of de Caux, published in the *Ann. de Mines de Belgique,* 1921. These gave a slower falling rate, which he says shows the effect of friction and displacement of water in reducing velocity, meaning, of course, that the grains were too crowded to fall at the free settling rate. (There would seem to be no reason why some of the less expensive cameras that take single exposures on a movie film could not be used for pictures spaced 1 sec. or even ½ sec.—Editor.)

The Manufacture of Gypsum Plasters

Part II—Calcination of Gypsite and Gypsum

By A. M. Turner, E.M.
Denver, Colo.

ONE NEED ONLY TALK to men in the gypsum industry (especially practical men) a short time to find that there is much confusion, contradiction, and even superstition regarding the various phases of calcination.

Some practices, which are antiquated but to some extent have served and still do serve a useful purpose in calcining are:

1. The use of a long stick to push into the kettle contents to "feel" what stage in the cycle has been reached. The adhesion of the stucco to the stick serves as a clue to the condition of the material.
2. Smelling the steam from the cooking gypsum.
3. The feel of the steam to the hand.
4. Noting the appearance of the calcining mineral.
5. Listening to the noise of the kettle machinery.

These practical methods are to some extent based on sound facts, though in themselves are not entirely reliable and needless to say are far from being scientific control.

Interpretation of Thermometer-Chart Curves

The most up-to-date process for controlling gypsum or gypsite calcination is by use of recording thermometers and this article will deal with calcination and interpretation of thermometer chart curves.

In the following discussion it is assumed that the raw material is properly prepared to be added to the kettles. No preliminary grinding is required for gypsite. Preliminary processing controls calcination by regulating free moisture content and fineness of the material, but these conditions have little bearing on the general principles involved.

Gypsite Calcination

By referring to curve "I" on the thermometer chart illustration, you will see a tracing of an actual line made by a recording thermometer in a gypsite kettle during a complete batch. Had the raw material been uniform, kettle fires constant, and kettle filling machinery functioning perfectly, a good calciner could make a curve which was absolutely uniform.

Point *a* represents the time and temperature at which the previous kettle was dumped. Immediately after the kettle gate was closed, land plaster was added into the kettle until the temperature was lowered to 240 deg. as shown at point *b*. (The temperature scale shown on the accompanying chart is in degrees Fahrenheit.)

On account of the usual high moisture content in gypsite and the nature of the impurities associated with it, only a limited amount of material can be added to the kettle without damage from sticking the agitators. The heat which is continually applied to the kettle raises the heat of the gypsite as shown between points *b* and *c*. During the upward trend of the curve most of the free water is expelled from the land plaster as well as part of the water of crystallization.

When the stucco has reached point *c*, about 260 deg., an active boiling condition exists and the kettle shaft pulls easily, so more raw material can be added. Then the heat is again pulled down. A large volume of free water is expelled during the descent of the curve, but the combined moisture changes little at this time.

The calcination process continues by alternately charging the kettle until the temperature is lowered as much as possible without danger of stalling the machinery, and then letting the heat rise until free boiling makes agitation easy. In general practice 500 to 2000 lb. of land plaster is added to a charge; the variation depending upon the free moisture in the raw material, nature and amount of impurities present. The $CaSO_4 \cdot 2H_2O$ content in gypsite varies from 65% to 90% in many cases. Impurities consist principally of calcium carbonate, sand, clay, small quantities of many soluble salts, and organic matter.

The place marked *d* on the chart represents the end of the last charge, which is determined by a full kettle, or an amount deemed advisable to cook. From this point on the heat applied raises the temperature, and during this period the last of the free water and three-quarters of the crystallized water is expelled to give the final product called stucco ($CaSO_4 \cdot \frac{1}{2}H_2O$).

The temperature at which the batch described above was dumped is 360 deg., but the dumping temperature is arbitrary and in practice, even in the same localities, the end point used by different companies varies from 335 to 385 deg. This discrepancy is one of the facts which bear out the stipulation made in the first paragraph in this article. There is some justification for varying the dumping temperature at different localities where on account of a difference in altitude the boiling point of water varies, or because the purity of the gypsite is vastly dissimilar.

The long period of calcination required for gypsite subjects the first material charged into the kettle to excessive heat, which affords the possibility of converting some of the mineral to the form of anhydrite ($CaSO_4$). Since the free moisture content of the raw material, which has been discussed above, varies commonly from 5% to 35%, the time required to cook a batch of 10 tons of stucco will be between 3 and 8 hours. The chart here referred to indicates a 10-ton batch of stucco made from land plaster containing 20% to 25% free moisture and with a gypsum content of about 83%.

By carefully observing the surface of a kettle of stucco one will perceive that at temperatures between 240 and 315 deg. a vigorous boiling action exists with the evolution of steam, but at a heat of 330 to 375 deg. this feature subsides and the surface of the kettle contents ceases to bubble and assumes a quiet rolling action, little puffs of dust arise from the edge around the kettle shell, practically no steam is given off, and if the hand is held directly over the stucco no burning sensation will be felt as exists at lower temperatures. These features make it possible for an experienced calciner to determine the end point, or first settle during calcination, with a rough degree of satisfaction.

A most important consideration in gypsite calcination is to leave a prime of ½ to 1 ton of stucco in the kettle after dumping the remainder of its contents. Otherwise the results when starting a new batch are disastrous, because the wet raw material coming in contact with the hot kettle bottom, not only seriously damages the base, but the land plaster will adhere tightly to the bottom and sides of the container and may even coat over the discharge outlet so the following batch will not discharge when the gate is opened. The larger the amount of water in the raw material the more stucco should be left in as a prime. This charge which remains in the kettle is subjected to excessive heating and consequently some of the material is converted to soluble and insoluble anhydrite.

Firing the Kettle

The adopted procedure for firing calcining kettles is to maintain the maximum heat

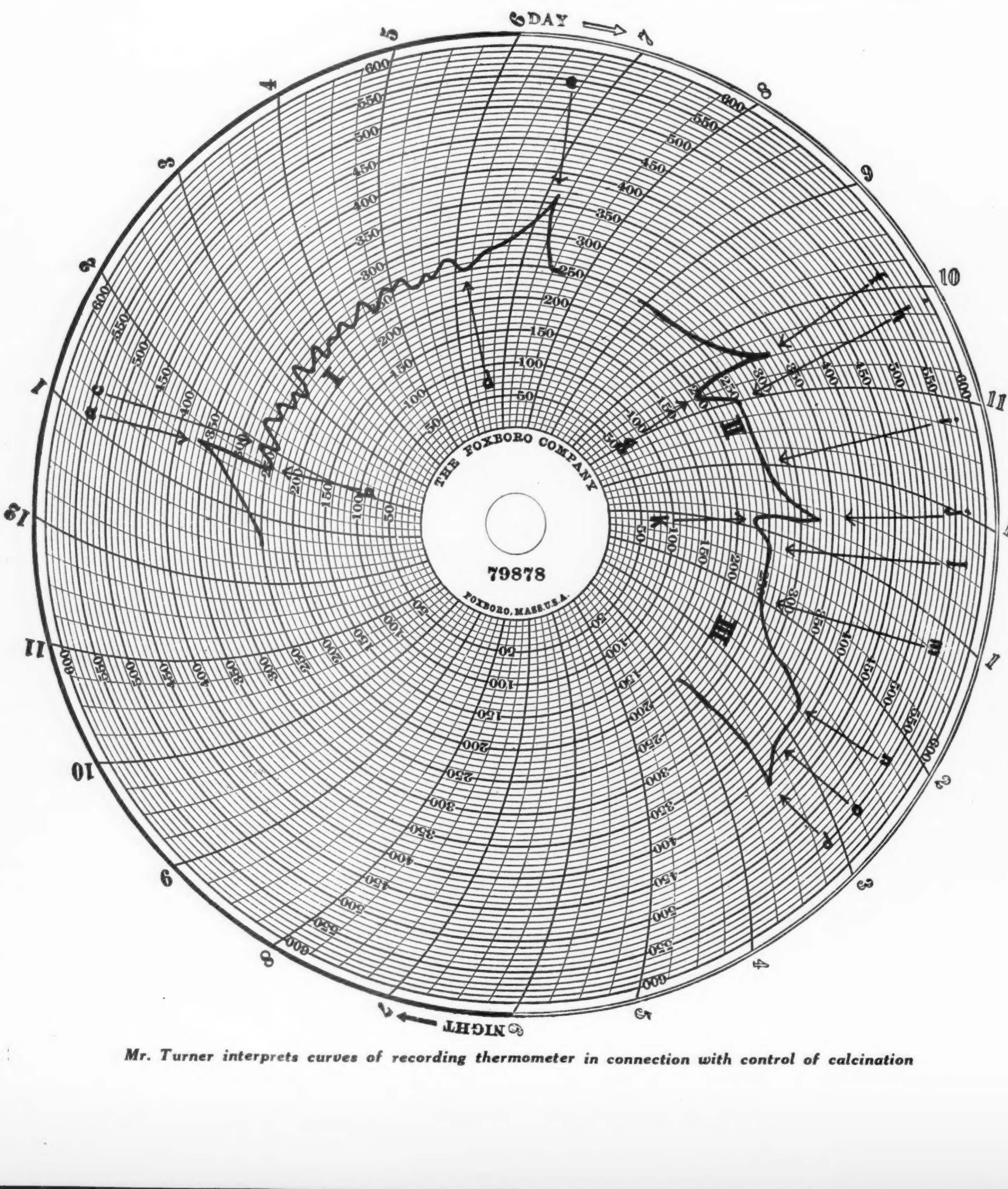
with an efficient fire that can be used without excessive damage to the furnace or kettle. On an average the temperature of the gases entering the stack from the kettle should be about 1000 deg. F. A practice sometimes used to prolong the life of kettle bottoms is to cut off the fire about five minutes before the stucco is ready to be dumped and allow the potential heat of the kettle to complete the batch. This avoids dumping cold wet land plaster into an excessively hot kettle, but the question arises as to whether or not the saving on equipment justifies the sacrifice in production.

Efficiency in firing is a complete subject in itself and will not be treated in this discussion.

Calcination of Gypsum to First-Settle Stucco

Gypsum which is prepared for kettle calcination usually is ground so about 70% passes the 100-mesh sieve. Variation in grind causes some difference in the results of calcination. If there are particles in the land plaster which are too coarse they will not completely calcine and the center of these lumps is uncooked $CaSO_4{\cdot}2H_2O$, which when reground disseminates as small particles of gypsum throughout the stucco and acts as an accelerating agent. On the other hand it is often not practicable to use finely ground material in the kettles because gypsum, if at all wet, is difficult to grind fine. Stucco is usually reground to the necessary fineness.

Reference to curve "II," point *f* shows where one kettle was dumped and immediately a new charge was begun. Contrary to charging gypsite kettles the rock gypsum is continuously run into the pot until it is full. Point *g* indicates a full batch, about 14 tons, which was charged during 15 minutes time and the raw material brought the temperature down to 200 deg. The absence of large amounts of free water and impurities make such a charge possible. From point *g* the heat rises to 250 deg. and during this phase of the cycle any free moisture present is expelled and the $CaSO_4{\cdot}2H_2O$ begins to give off some water of crystallization and change to $CaSO_4{\cdot}$



Mr. Turner interprets curves of recording thermometer in connection with control of calcination

$\frac{1}{2}H_2O$. The reduction to stucco becomes acute at a temperature of 250 deg. and water is given off so rapidly that the temperature of the cooking mass remains practically the same, even though the temperature of the fire under the kettle is considerably increased. Boiling action is vigorous at this time.

At point *i*, most of the gypsum has been changed to stucco and the heat applied to the kettle can no longer be consumed by dehydration of the small amount of gypsum which remains, so the temperature begins to rise and the part of the cycle, commonly called the cookoff, is in progress. As the curve approaches 330 deg., steam ceases to be given off, boiling subsides, and the contents of the kettle settle down several inches. This phenomenon is termed "first-settle" stucco and determines the end point in ordinary calcination, which is usually 330 to 335 deg. However, there is some variation in the dumping temperature used by various companies and in different localities. The composition of the product described above is stucco ($CaSO_4 \cdot \frac{1}{2}H_2O$), with which is intimately mixed very small quantities of gypsum ($CaSO_4 \cdot 2H_2O$) and artificial anhydrite ($CaSO_4$). Most of the impurities present in the crude gypsum or gypsite remain unchanged during calcination.

Second-Settle Stucco

A "second-settle" calcination curve is completely shown by diagram "III" between points *j* and *p*. However the process used until the temperature reaches 335 deg. (shown at 2:30 p.m. on the chart) is exactly the same as described previously for "first-settle" stucco, so the description will be from this point on. As the temperature rises from 335 deg. the dormant stucco gradually begins to boil and when 380 deg. is reached the boiling becomes vigorous, and the temperature remains constant on account of the fact of the rapid dehydration which is changing the stucco ($CaSO_4 \cdot \frac{1}{2}H_2O$) to soluble anhydrite ($CaSO_4$).

This boiling period differs from the one described, at the 250-deg. temperature, under first-settle stucco, because it is of shorter duration. The reason for this is due to the fact that during the first boil about 15% of water is evaporated, compared to 6% for second boil. The part of the curve between *n* and *o* represents second boil. Since dehydration is nearing completion the temperature again rapidly rises as shown between points *o* and *p*; the evolution of steam lessens and boiling subsides until the temperature reaches about 420 deg. at which time the whole kettle contents rapidly settle down so the level of the stucco is at least 18 to 20 in. lower than the original surface had been. When the batch has reached this condition it is called second-settle stucco. One watching the stucco when it goes into second settle may almost think that the bottom has dropped out of the kettle, on account of the distinct and abrupt settling down of the material. The kettle should be dumped immediately when the settle takes place or, almost without exception, the result will be a stuck kettle.

The product from second-settle calcination is primarily soluble anhydrite, although some of the anhydrite is in the insoluble form, and there will also be a little hemihydrite.

Summarizing the discussion above it may be said that calcining second settle stucco is the process of dehydrating a mineral which has two stable hydrates. The cycle of the process involved is divided into seven distinct phases as follows:

1. The fill. (Beginning of free moisture elimination indicated by the curve from *j* to *k*.)
2. Remainder of free moisture elimination and start of breaking down water of crystalization, *k* to *l*.
3. First boil (changing gypsum to the hemihydrate; *l* to *m*).
4. Going through first settle and approaching second boil. (The maximum amount of hemihydrate, first-settle stucco, occurs about midway between *m* and *n*.)
5. Second boil (changing stucco to anhydrite; line *n* to *o*).
6. Cook off (*o* to *p* when completing dehydration).
7. Second settle (point *p* where dehydration is complete and the calcined gypsum settles into a compact mass).

Unbelievable confusion exists in the industry concerning the process involved in the manufacture of second settle stucco and undoubtedly criticism will flow freely concerning the treatment of the preceding subject. However, the calcination curves described are taken from actual operation and while particular local conditions may cause slight variations from the principles outlined, their foundation is sound and should be applicable to general conditions.

The statement has been made that what has been previously said about kettle-firing applies to first- and second-settle gypsum as well as to gypsite calcination.

It has been rumored that in times past gypsite was cooked to second settle, but if this has ever been practiced the process has given way to first settle material.

Artificial Second-Settle Stucco

The value of second-settle stucco lies in the fact that it is a product with a low consistency and high strength, which is particularly desirable for many gypsum products such as molding, casting, and gaging plasters. First-settle stucco can be made to have a low consistency and high strength in two ways.

First, by spraying a fine mist of water into a mixer of hot stucco. The amount of water which can be used depends upon the stucco temperature. For illustration, 10 gal. of water may be used in a ton of stucco which is about 275 deg. F.

Second, a fine spray of calcium chloride solution is run into a kettle of stucco just after the first boil has started vigorously. The chloride solution is made by dissolving about 4 lb. of commercial calcium chloride in a gallon of water. Air pressure is used to force the solution through a garden hose to form the spray. The general practice is to add 1 to 1½ gal. of solution for each ton of stucco and 1 to 3 minutes is consumed to spray the necessary amount of solution into the kettle.

The above methods are patented, but it is entirely probable that other processes will accomplish similar results.

Conclusions

The aforesaid leads to several outstanding factors and misconceptions in calcination principles which offer outstanding opportunity for distinct progress and efficiency improvements to be made.

Most outstanding of these conditions are:

1. Dry gypsite should be delivered to kettles to avoid wasting kettle heat for driving off free moisture when a more efficient process could be used to accomplish this work.
2. The dumping temperature or end point in calcination is rather arbitrary and should be worked out on a more scientific basis.
3. Second-settle stucco is rapidly becoming a thing of the past and manufacturers who haven't already done so will do well to look for a method of securing the same product by a cheaper process.

(To be continued)

Bibliography on Industrial Research

A BIBLIOGRAPHY of selected articles from the technical press on industrial research, covering a period of five years (1926-1930), has been compiled by Clarence J. West and published by the Division of Engineering and Industrial Research of the National Research Council, 29 West 39th street, New York City, under the title of "Five Years of Research in Industry."

The author states that in compiling this list of references the material has been selected with three main points in view: first, papers dealing directly with the value of industrial and scientific research, especially as they relate to a given industry; second, papers dealing with the development of a given industry or a particular industrial process, and third, papers discussing the future of and the problems facing the industry today. Thus the reader's survey of the papers falling under these three headings will give him a picture of the past, present and future of a given field of research and will enable him to evaluate the need and value of research and probable results to be achieved in the industry considered.

Of particular interest to ROCK PRODUCTS readers are those sections of the bibliography listing the articles on cement and concrete, lime, industrial chemistry, geology, mining, highway engineering and metallurgy.

Recent Applications of Cable Excavators at Gravel Plants

Crawford Sand and Gravel Co., Meadville, Penn., Strips and Works Bank Deposit with Power Drag Scraper; Lutesville Sand and Gravel Co., Lutesville, Mo., Supplements Power Drag Scraper Operation with Small Industrial Railway

UNDOUBTEDLY one of the most popular methods of producing sand and gravel in small and medium sized plants is with some form of cable excavator. Hence new or interesting applications of this device interest a relatively large number of producers. The two plants described briefly in what follows illustrate the elasticity of this device.

Crawford Sand and Gravel Co.

The Crawford Sand and Gravel Co., Meadville, Penn., works a bank deposit of sand and gravel with a 2-cu. yd. Sauerman power drag scraper, operating on a span of several hundred feet around a field hopper where the material is fed to a belt conveyor for transportation to the plant. The same scraper serves for all of the stripping work, as the company takes advantage of the winter shutdown of its plant to relocate the scraper system and remove the topsoil from a new section of the deposit, dumping the spoil into a worked-out portion of the pit.

In the stripping operations of last winter this company cleared off a layer of overburden 11 ft. thick from an area of approximately 180x175 ft., casting the spoil into the worked-out section of the pit adjacent. This old pit, incidentally, had furnished about 40,000 tons of marketable sand and gravel in addition to some quantity of sand that was not marketable.

To do this stripping work the electric scraper hoist and the head mast were set up on the farther edge of the old pit and the operating cables reached out across the old workings to the site of the stripping. The tail end of the span was fixed by a low tail tower at the rear of the area to be stripped, and the scraper worked forward from this tail tower to the point where the spoil was discharged over the edge of the area into the old pit. The line of operation was shifted at intervals by means of a hand-winch rapid-shifting device, which is used on earth-moving jobs such as this to crowd the scraper bucket against the side of the cut and avoid the formation of ridges.

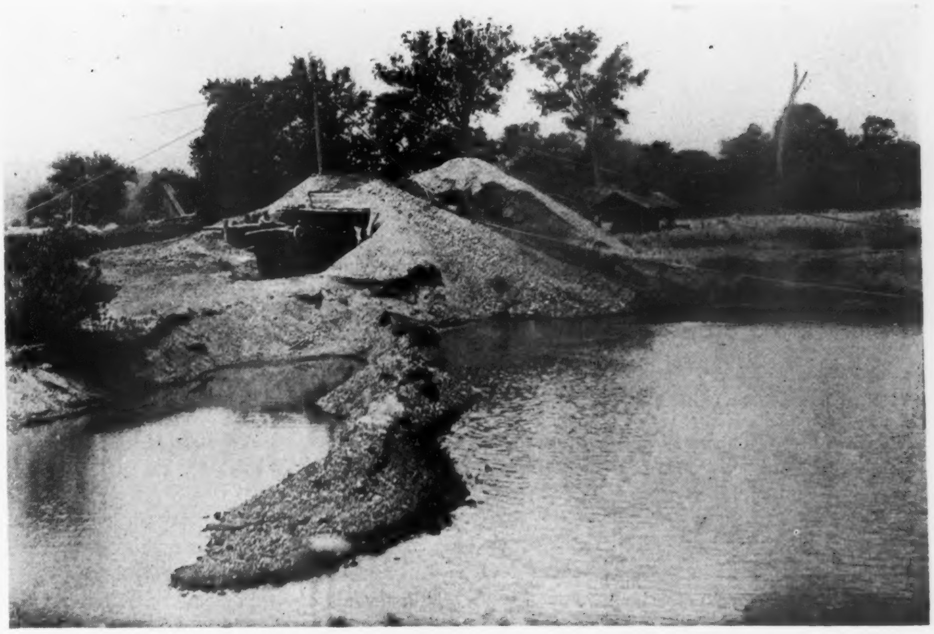
Much of the stripping work during the past season was done in extremely cold weather, the temperature being many times below zero, and the scraper's capacity over the 400-ft. span was kept down to an aver-

General view of old pit and stripping operation on new area at Crawford Sand and Gravel Co. plant. In foreground, head-post and hopper where scraper previously fed gravel to belt conveyor

age of about 40 cu. yd. per hour. Nevertheless, the total stripping expenses were only \$2,766.00, or considerably less than a season's stripping with any method that had been tried previously, according to officials of the company.

Lutesville Sand and Gravel Co.

After four years of excavating sand and gravel from a field near its plant at Lutesville, Mo., with a 1½-cu. yd. power drag scraper, the Lutesville Sand and Gravel Co. had exhausted practically all of the material available at that location and needed to extend its operations farther into the pit. In its original location, the scraper delivered material to a hopper that fed a 500-ft. belt conveyor leading to the top of the screening plant, and the most common way of extending an operation such as this is to lengthen the conveying system. This company, however, installed a small industrial railway system that carries material from a new field hopper 1500 ft. away to the hopper at the foot of the inclined belt conveyor.



Cable excavator feeding sand and gravel from pit to field hopper which serves industrial car system at Lutesville plant

A second 1½-yd. Sauerman "Crescent" scraper was installed at the new section of the pit to feed the industrial cars, and the original scraper has been left at its old location for auxiliary service whenever desired. The new scraper system, working on a span of 300 ft. from the field hopper has enough material within its reach to serve the plant for several years again without any change in the location of the field hopper.

The 1½-yd. scraper at the new location excavates both in the dry and under water, and drags the material up an incline to a loading chute 44 ft. long with a two-way hopper. From this hopper the sand and gravel are fed into 5-cu. yd., side-dump, industrial cars which are hauled 1500 ft. to the plant by gasoline locomotive. Several hundred feet from the plant the cars empty into a 9- by 24-ft. storage hopper, from which the materials are carried to the screens by the 24-in. inclined conveyor belt.

Dumping strippings into worked-out section of pit at Crawford operation with 2-yd. cable excavator

Cars of 5-yd. capacity bring material from scraper to inclined belt elevator of plant at Lutesville Sand and Gravel Co.

The storage hopper at the foot of the belt conveyor is divided into three compartments, each with its separate gate for loading on the belt, so that while one compartment is feeding the belt the other two allow the sand and gravel to stand long enough for most of its water to drain out. This, along with a preliminary drainage from the dump cars during the trip from the field hopper, dries out the material enough that it can be handled up a fairly steep incline on the belt conveyor without rolling or slipping.

Offices of the Lutesville Sand and Gravel Co. are at Cape Girardeau, Mo., and plants are operated at Lutesville, Jerome and Vienna, Mo., and Black Rock, Ark. The officers are A. W. Harrison, president; Hugh H. Humphreys, vice-president and general manager; Robert Harrison, secretary, and C. L. Harrison, treasurer. Lou V. Davis is superintendent of the Lutesville plant.

Ohio Producer Gives County Farmers All Limestone They Want

NUMEROUS LOCAL NEWSPAPERS in Ohio carry a story substantially like the following. If Mr. Beam's object was favorable publicity, by any newspaper man's estimate, he must be many thousands of dollars ahead, in whatever light his competitors may view his methods:

The Beam quarries of Melvin, Clinton county, are announcing that several thousands of tons of fine quality agricultural limestone is available at the plant, free of charge to any Fayette county farmers who desire to haul it away.

In a letter to the *Washington Court House Herald*, Mr. Beam says:

"Every farmer in Fayette county is invited to come to our plant at Melvin and take as much of this material as he can use, it being only necessary that he load the material on his own wagon or truck and report the tonnage to our office.

"Agricultural limestone is a farm commodity that is productive of enormous returns when used on acid soils. The Ohio Agricultural Experiment Station reports that the use of agricultural limestone on acid soil will increase productivity from 20% to 100%.

"Thousands of farmers in Ohio are buying agricultural limestone, paying from $3.50 to $5 per ton for it delivered to their nearest railroad station. We have several thousand tons of the very finest agricultural limestone in storage at our plant which as a matter of co-operation with the farmers of Fayette county we are offering to them free of cost.

"In such instances as the distance is too great to justify wagon or truck hauling we will load this material into carloads at the bare cost of loading and switching, 25 cents per ton. The farmer would, of course, have to pay the freight charges at destination.

"This is an opportunity for the farmers of Fayette county to secure thousands of dollars worth of soil fertility at no expense other than transportation and handling and we invite them to take advantage of it.

"This offer stands good throughout the months of August and September. We are sincere in wanting a great tonnage of this material distributed in Fayette county and will appreciate any co-operation your newspaper will offer."

Fluorspar Industry in 1929

AS WAS TO BE EXPECTED in a year in which the steel industry, the chief consumer of fluorspar, made a record output, the fluorspar producers did a larger volume of business in 1929 than in 1928, according to a statement prepared by Hubert W. Davis, of the United States Bureau of Mines, Department of Commerce. The increase in shipments of fluorspar from domestic mines, however, did not keep pace with the increase in imports of fluorspar, notwithstanding an increase in the rate of duty on fluorspar containing not more than 93% of calcium fluoride.

A noteworthy accomplishment in the fluorspar industry in 1929 was the placing in commercial operation on March 18 of the flotation mill at Rosiclare, Ill., by the Franklin Fluorspar Co. At this mill acid-grade concentrates are recovered from mill tailings that heretofore were believed to be worthless. The mill feed in 1929 consisted of 11,868 short tons of mill tailings containing 60%, more or less, of calcium fluoride and the yield therefrom was 3,062 short tons of No. 1 concentrates suitable for use in the preparation of hydrofluoric acid and 575 short tons of No. 2 concentrates suitable for use in the manufacture of cement

Shipments in United States

The shipments of fluorspar from mines in

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1928-1929, BY STATES

	1928			1929		
	Short	Value		Short	Value	
State	tons	Total	Average	tons	Total	Average
Illinois	65,884	$1,154,983	$17.53	67,009	$1,284,834	$19.17
Kentucky	69,747	1,426,766	20.46	70,827	1,390,603	19.63
Colorado	1,815			4,808	56,607	11.77
New Mexico	2,589	74,805	15.40	2,438	59,082	15.57
Nevada	455			1,357		
	140,490	2,656,554	18.91	146,439	2,791,126	19.06

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1928-1929, BY KINDS

	1928			1929		
	Short	Value		Short	Value	
Kind	tons	Total	Average	tons	Total	Average
Gravel	122,021	$2,126,534	$17.43	127,054	$2,231,254	$17.56
Lump	6,186	161,603	26.12	8,325	201,725	24.23
Ground	12,283	368,417	29.99	11,060	358,147	32.38
	140,490	2,656,554	18.91	146,439	2,791,126	19.06

FLUORSPAR SHIPPED FROM MINES IN THE UNITED STATES, 1928-1929, BY USES

	1928			1929		
	Short	Value		Short	Value	
Use	tons	Total	Average	tons	Total	Average
Steel	108,064	$1,641,190	$15.19	118,904	$2,031,248	$17.08
Foundry	3,694	66,215	17.93	3,498	69,712	19.93
Glass	6,499	195,885	30.14	5,742	183,641	31.98
Enamel and vitrolite	4,713	142,495	30.23	3,879	125,646	32.39
Hydrofluoric acid and derivatives	15,946	585,092	36.69	12,906	354,235	27.45
Miscellaneous	1,176	19,091	16.23	1,004	15,023	14.96
Exported	398	6,586	16.55	506	11,621	22.97
	140,490	2,656,554	18.91	146,439	2,791,126	19.06

the United States in 1929, amounting to 146,439 short tons, consisted of 127,054 tons of gravel fluorspar, 8,325 tons of lump fluorspar, and 11,060 tons of ground fluorspar. The general average value for all grades per ton f. o. b. mines or shipping points in 1929 was $19.06, 15 cents more than the 1928 average. The general average value of the fluorspar shipped to steel plants in 1929 from the Illinois-Kentucky district was $17.36 a ton and from the Colorado-New Mexico district $12.69 a ton. This difference in average values represents chiefly economic factors in marketing rather than differences in quality of fluorspar from these two districts. Fluorspar was shipped from Colorado, Illinois, Kentucky, Nevada, and New Mexico in 1929, and each state, except New Mexico, recorded an increase.

The shipments of fluorspar to steel plants by domestic producers were 10% more in 1929 than in 1928, and there was an increase of 27% in exports of fluorspar in 1929. There were decreases in the shipments of fluorspar in 1929 to each of the other industries in which the mineral is used. The shipments of acid-grade fluorspar from domestic mines in 1929, though 19% less than in 1928, were equivalent to about 83% of the total fluorspar consumed in the United States in 1929 in the manufacture of hydrofluoric acid, whereas shipments of domestic acid-grade fluorspar in 1928 were equivalent to only about 78% of the total.

The accompanying tables show the details of the shipments of fluorspar by states, by kinds and by uses for 1928 and 1929. The figures on production of fluorspar in Illinois were collected in co-operation with the State Geological Survey.

Stocks at Mines

The stocks of fluorspar at mines or at shipping points on December 31, 1929, consisted of 14,560 short tons of gravel fluorspar, 2,879 tons of lump fluorspar, and 689 tons of ground fluorspar, a total of 18,128 tons of "ready-to-ship" fluorspar. In addition there was in stock piles at mines at the close of 1929 about 56,000 tons of crude (run-of-mine) fluorspar which must be milled before it can be marketed and which is calculated to be equivalent to 31,000 tons of merchantable fluorspar. These stocks compare with 12,162 tons of "ready-to-ship" fluorspar and 60,456 tons of crude fluorspar on December 31, 1928.

Industry in 1929, by States

As an indication of distribution, shipments from Illinois in 1929 went to various industries as follows:

	Short tons
Steel	58,153
Foundry	1,388
Glass	2,309
Enamel	1,694
Hydrofluoric acid	3,411
Miscellaneous	33
Exported	21
	67,009

FLUORSPAR CONSUMED AND IN STOCK IN THE UNITED STATES, 1928-1929, BY INDUSTRIES, IN SHORT TONS

Industry	1928 Consumption	1928 Stocks at consumers' plants December 31	1929 Consumption	1929 Stocks at consumers' plants December 31
Basic open-hearth steel	152,000	76,000	156,200	71,200
Electric-furnace steel	6,100	1,300	6,500	1,100
Foundry	3,300	1,000	3,000	700
Ferro-alloys	800	400	900	300
Hydrofluoric acid and derivatives	20,500	11,000	15,600	14,000
Enamel and vitrolite	5,700	900	5,200	700
Glass	6,200	1,200	6,600	1,000
Miscellaneous	1,600	600	1,500	600
	196,200	92,400	195,500	89,600

FLUORSPAR IMPORTED INTO THE UNITED STATES, 1928-1929, BY COUNTRIES* (GENERAL IMPORTS)

Country	1928 Short tons	1928 Average value	1929 Short tons	1929 Average value
Africa:				
British—				
South	2,661	$13.71	5,106	$11.56
Other	....		1,281	13.15
Argentina	20	18.00	....	....
Belgium	....	....	21	24.71
China	756	10.85	1,345	8.58
France	15,072	9.38	16,850	9.44
Germany	17,601	8.57	16,488	8.54
Italy	1,033	9.29	1,258	8.37
Spain	680	7.61	7,168	7.26
United Kingdom	9,360	6.05	4,828	6.33
	47,183	$8.66	54,345	$8.85

*Figures compiled from the records of the Bureau of Foreign and Domestic Commerce and those for 1929 subject to revision.

In Illinois 15 mines or prospects were worked, more or less, in 1929, as compared with 9 mines or prospects worked in 1928. The Daisy-Eurekas group, Hillside, Spar Mountain, and Victory mines were the chief producers, these mines accounting for 93% of the total fluorspar shipped in 1929.

Some of the noteworthy features in the fluorspar field in Illinois in 1929 were the placing in operation and the results therefrom of the flotation mill of the Franklin Fluorspar Co.; the opening up and development to the 637-foot level of a large body of high-grade fluorspar at the Daisy mine; the completion of a modern river-loading station to serve the Hillside mine; the completion of a new mill at the Spar Mountain mine and the erection of 2500-ton capacity storage bins near the Ohio River and the installation of loading equipment on the Ohio River to serve the Spar Mountain mine; and the reported discovery of a third ore body at the Victory mine.

Imports

The imports of fluorspar into the United States in 1929 amounted to 54,345 short tons, valued at $480,975, and are the third largest ever recorded. The imports in 1929 consisted of 30,148 short tons containing more than 93% of calcium fluoride and 24,197 tons containing not more than 93% of calcium fluoride. The imports in 1929 showed an increase of 15% and were equivalent to 37% of the total shipments of domestic fluorspar in 1929, as is shown in the accompanying table.

The greater part of the fluorspar imported in 1929 was sold to steel plants and the selling price at tidewater, duty paid, ranged from $14 to $19 a short ton and averaged about $17.90 a ton. The selling price of imported ground fluorspar, which was sold to manufacturers of glass and enamel, ranged from $23.50 to $44 a short ton at tidewater, duty paid, and averaged about $35.85 a ton.

Fluorspar Consumed and Stocked at Consumers' Plants

The figures on consumption of fluorspar in 1928 and 1929 and stocks at consumers' plants at the close of each of these years, given in the table, while not including data from all consumers, are believed to fall not far short of the total for the United States. Thus, the figures for the basic open-hearth steel industry, the chief consumer of fluorspar, include actual figures for the 66 companies that make 99% of the total basic open-hearth steel and estimates for the other 5 companies. Consumption of all electric-steel and ferro-alloy manufacturers that are known to use fluorspar is accounted for. The smaller foundries, some of which use a little fluorspar, are not at all represented, so that the figures for this industry are somewhat incomplete. The figures for fluorspar used in the manufacture of hydrofluoric acid represent actual figures for 5 companies and an estimate for 1 company. The consumption and stocks for the glass and enamel industries, although not covering all the consumers, represent 111 companies. These companies include all of the larger and probably most of the smaller consumers.

Effect of Gypsum on the Decomposition of Tri-Calcium Silicate by Heat

By Thomas F. Mullan
Riverside Cement Co., Riverside, Calif.

IT HAS BEEN SHOWN by Meyers* that tri-calcium silicate is decomposed at temperatures lower than those attained in the cement rotary kiln. The liberation of free lime upon heating of clinker had been noted at this laboratory. In our early work we noted that gypsum accelerated this decomposition. Since this was not observed by Meyers, we made subsequent tests which confirmed this phenomenon. These indicated that there existed the possibility of determining the amount of tri-calcium silicate present in a clinker by a heat treatment method, using gypsum as an accelerator.

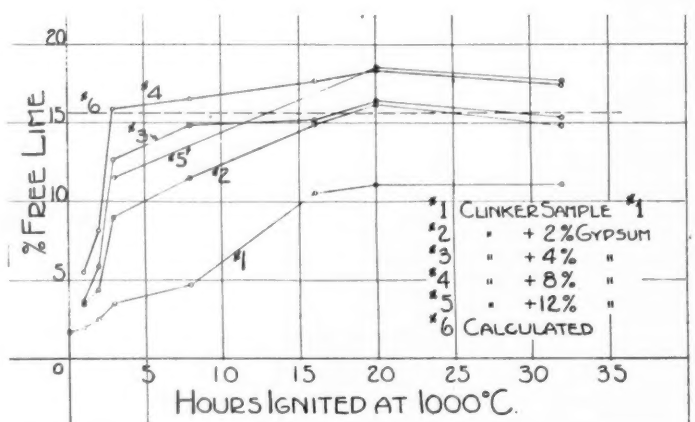


Figure I

Three different clinker samples were chosen having the compositions indicated in Table I. These samples were mixed with gypsum in amounts varying from approximately 2% to 12%, ground together in an agate mortar, ignited in a muffle furnace at 1000 deg. C. for varying time periods and the free lime determined by the revised method of Lerch and Bogue. The determined values of free lime were compared with the values calculated by assuming decomposition of tri-calcium silicate to di-calcium silicate and free lime. Results of this series are given in Table II.

To determine whether gypsum was decomposed at this temperature, thereby liberating additional free lime, the SO_3 content of the mixture was determined before ignition and also after 32 hours' ignition. The data presented in Table III indicate that within the limits of 2 to 8% gypsum there is no loss of SO_3. It appears that perhaps the higher concentrations do show decomposition, and free lime determinations were made on pure gypsum ignited at 1000 deg. C. for varying time intervals as shown in Table IV. The small amounts shown do not indicate that the gypsum contributed any great amount of the free lime determined in the mixes.

The curves No. 2 and No. 3 in Figs. 1, 2 and 3 indicate that at the long ignition periods the value determined very closely approaches the calculated value represented by the line called curve No. 6. Curves No. 4 and No. 5 on all three samples exhibit values beyond these calculated. The excess has not been satisfactorily explained. It may possibly be that the decomposition to di-calcium silicate is not that which actually occurs. It is proposed to use experimental clinkers having tri-calcium silicate contents about 10% higher and lower than the samples used in this series to determine whether gypsum at 2% and 4% will show

*S. L. Meyers, ROCK PRODUCTS, 33, No. 8, 78 (1930).

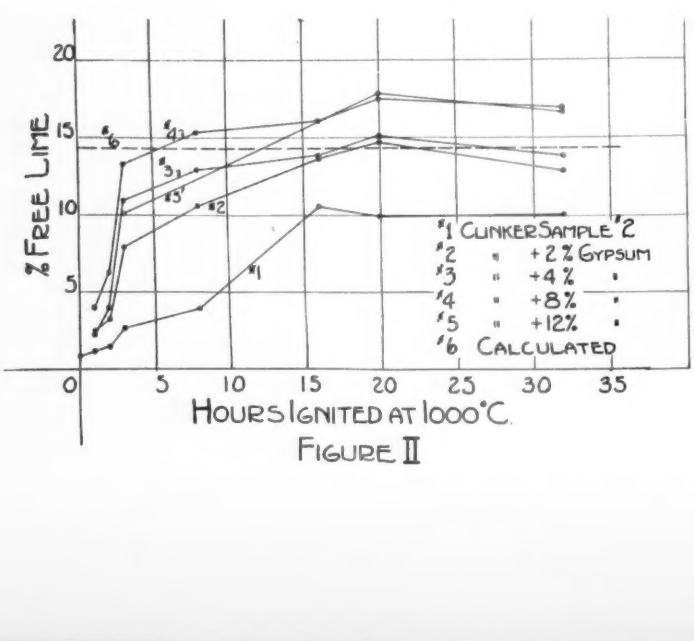


Figure II

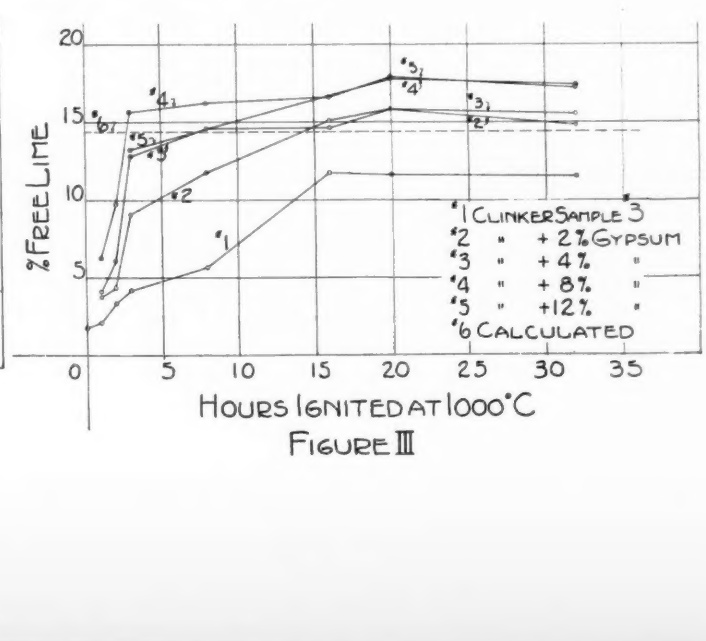


Figure III

TABLE II
(Data corrected for gypsum dilution)

Time of ignition		No ignition	1 hour	2 hours	3 hours	8 hours	16 hours	20 hours	32 hours
		% Free lime							
Clinker No. 1	0% gypsum	1.66	1.95	2.54	3.48	4.66	10.61	11.06	11.18
	2% gypsum	....	3.52	4.44	8.99	11.52	14.94	16.19	14.69
	4% gypsum	....	3.59	5.82	12.65	14.85	15.18	16.31	15.36
	8% gypsum	....	5.48	8.22	15.88	16.48	17.69	18.27	17.35
	12% gypsum	....	....	....	11.54	....	....	18.42	17.65
Clinker No. 2	0% gypsum	0.93	1.24	1.43	2.73	3.91	10.55	9.94	10.00
	2% gypsum	....	2.46	3.25	7.91	10.57	13.74	14.67	12.79
	4% gypsum	....	2.23	3.99	10.91	12.97	13.75	15.09	13.81
	8% gypsum	....	4.00	6.25	13.33	15.42	16.08	17.49	16.95
	12% gypsum	....	....	....	10.08	....	....	17.79	16.60
Clinker No. 3	0% gypsum	1.78	2.08	3.39	4.16	5.59	11.72	11.55	11.49
	2% gypsum	....	3.72	4.44	9.05	11.77	15.13	15.86	14.88
	4% gypsum	....	4.13	6.09	12.79	14.59	14.59	15.83	15.50
	8% gypsum	....	6.25	9.69	15.61	16.28	16.61	17.98	17.22
	12% gypsum	....	....	....	13.20	....	....	17.86	17.44

TABLE III

% Gypsum added	Clinker No. 1 — No ignition	Clinker No. 1 — 32 hr. igni.	Clinker No. 2 — No igni.	Clinker No. 2 — 32 hr. igni.	Clinker No. 3 — No igni.	Clinker No. 3 — 32 hr. igni.
1.89	0.89	0.94	0.88	0.94	0.88	0.94
3.80	1.78	1.82	1.78	1.81	1.75	1.78
7.33	3.40	3.50	3.41	3.43	3.42	3.43
10.62	4.94	4.42	4.93	4.51	4.95	4.42

calculated values for free lime at the long ignition periods.

The experimental determinations were made by Eugene A. Ledyard and Lowell B. Wilson of this laboratory.

TABLE I

	Clinker No. 1	Clinker No. 2	Clinker No. 3
SiO_2	21.18	21.56	21.04
Al_2O_3	5.94	5.89	6.01
Fe_2O_3	2.48	2.59	2.55
CaO	65.85	65.28	65.16
MgO	4.32	4.24	4.80
Loss	0.15	0.18	0.19
$CaO \cdot 4Al_2O_3 \cdot Fe_2O_3$	7.55	7.88	7.78
$3CaO \cdot Al_2O_3$	11.55	11.23	11.62
$3CaO \cdot SiO_2$	56.91	54.86	54.10
$2CaO \cdot SiO_2$	17.80	20.43	19.51
Free CaO	1.66	0.93	1.18
Free CaO (theoretical from $3CaO \cdot SiO_2$)	13.94	13.44	13.25
Total calculated free CaO	15.60	14.37	14.43

Technical Dictionary in Three Languages

THE SECOND edition of the Techno-Dictionary has just been issued. The book is a collection of technical terms as found in reading foreign technical periodicals and books. Each word or term is given in German and Italian and then translated into English. This new edition, which is revised and enlarged, contains a considerable number of terms not included in the previous edition. It should be found invaluable to readers of foreign technical periodicals.

Copies may be secured by addressing Hubert Hermanns, Dahlemerstrasse 64 A, Berlin-Lichterfelde, Germany, at $3.75.

Correction

IN MAKING UP the August 2 issue, two pages of Elliott Hastings' story on "Diatomite as a Concrete Admixture Material" became transposed. Page 56 should be 57 and vice versa.

TABLE IV

Time of ignition	% SO_3	% Free lime
No ignition	47.01	0.00
3 hours	46.39	0.00
20 hours	45.74	0.43
32 hours	46.58	0.00

Volatilization of Phosphorus From Phosphate Rock

VOLATILIZATION OF PHOSPHORUS from phosphate rock has been studied by Robert D. Pike, chemical engineer of Emeryville, Calif., for the Stockholders' Syndicate of Los Angeles, who are interested in the development of western phosphate rock from southeastern Idaho. The results of Mr. Pike's investigations have been published in a series of articles, starting March, 1930, in *Industrial and Engineering Chemistry*.

The first paper records results of experiments in crucibles and rotary kilns. Experiments were conducted in covered crucibles for the purpose of determining the effect of the variables, time, temperature and mixture in the volatilization of phosphorus from mixtures of western phosphate rock, char and silica in varying proportions and sizes.

If sufficient carbon were present in a mixture of phosphate rock and sand which would fuse when carbon was absent or present in usual amount for reduction between 1300 and 1400 deg. C., temperatures as high as 1650 deg. C. could be attained without showing visible signs of fusion. Other conditions being correct, a temperature of 1450 deg. to 1500 deg. C. was required in the reacting materials for rapid and substantially complete elimination of phosphorus.

Experiments to effect volatilization of phosphorus in a rotary kiln from mixtures similar to those tested in the crucibles are described. Owing to insufficient thermal head phosphorus was not volatilized. The low thermal head resulted from the rapid burning of carbon by carbon dioxide to carbon monoxide, a strongly endothermic reaction. Phosphorus was finally volatilized by adding oxygen to the preheated blast.

The second paper deals with experiments that were conducted, using a blast furnace for volatilization of phosphorus and potash. A detailed description is given of two continuous runs of an experimental blast furnace supplied with an oxygen-enriched blast. In one run, the furnace charge consisted of phosphate rock, a siliceous flux and coke; and in the second run the siliceous flux was replaced by a potash-rich flux. The average extraction of P_2O_5 was about 70% and of K_2O, 47%.

Further experimental work with the slags on a small scale led to the conclusion that with a proper furnace design and correctly proportioned slags, extractions of 97 and 92% of P_2O_5 and K_2O, respectively, can reasonably be expected. Recommended slag closely resembles that employed in an iron blast furnace; free-running properties are the chief consideration in determining its composition. The slag should be tapped at from 1450 deg. to 1500 deg. C. Under strongly reducing conditions phosphorus will be almost completely evolved from slags of a basic nature similar to those employed in iron blast furnaces, and relatively basic slags are required for the high extraction by volatilization of potash. Blast furnaces operated along the lines indicated by the experiment with hot oxygen-enriched blast for the joint volatilization of P_2O_5 and K_2O may be expected to operate smoothly and continuously.

Origin of Talc in Fichtel Mountain Deposit

A DESCRIPTION of the origin of talc in the Gopfersgrun-Thiersheim stratum of the Fichtel Mountains, by Eduard Enk, a German engineer, declares that the original limestone deposit was dolomitized by a $[Mg(HCO_3)_2]$ solution. Frequent pseudomorphs of talc and magnesite after calcite are found. A Mg silicate gel coating formed on the dolomite surfaces by the neutralization of $+$ Mg $(OH)_2$ and $-$ SiO_2 solutions. Three cases are possible, depending on stoichiometric proportions of Mg and SiO_2 to form $MgSiO_3$ and excess of either Mg or of SiO_2.

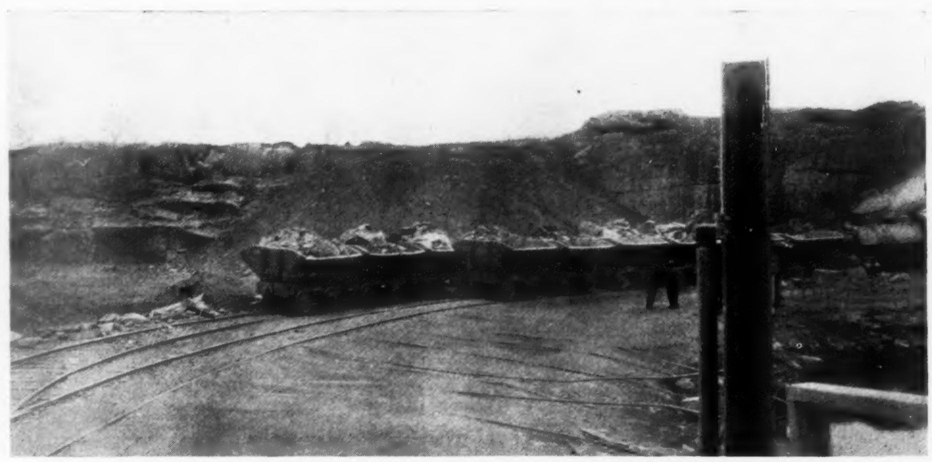
The gel is permeable to SiO_2 solutions, which converted the dolomite to a Mg silicate gel with the Ca diffusing away. Where the SiO_2 solution acted directly on the dolomite with no gel on the surface, the talc surface is separated sharply by a chalcedony layer above which crystallized quartz is found.

Quartz was changed to talc by the dispersing action of water and subsequent proportion of Mg silicate gel by coagulation of the oppositely charged $Mg(OH)_2$ and SiO_2 solutions. The Mg silicate gel was subsequently changed by aging and by heat and pressure to talc.

Hints and Helps for Superintendents

Saving Wear on Hoist Cable

AT THE SECURITY PLANT of the North American Cement Corp., near Hagerstown, Md., the quarry cars are pulled up an incline to the primary crusher from a track approach that is crescent-shaped. This arrangement means then that the hoist cable does not conform to the shape of the track but whips across the chord of this arc. This whipping of the cable on the bare ground was harmful and shortened the cable's life, so a grid of old pipes was laid parallel, flush with the ground. The cable now whips over the top of this pipe grid with far less friction and wear.



Pipe grid in use at an Eastern cement plant saves wear on hoist cable

Cutting Heavy Material with the Oxygen Lance

IT IS NOT GENERALLY realized that the oxy-acetylene process can be used to cut iron and steel of almost unlimited thickness. Cutting large masses used to be a problem about many plants. These problems are now successfully solved by the use of the oxygen lance in conjunction with the oxy-acetylene cutting blowpipe.

The accompanying illustration shows a frozen ladle of steel 8 ft. high and weighing 65 tons being cut to handling size.

Using an oxygen lance to cut thick steel castings

An oxygen lance is a simple device. It consists essentially of a length of ⅛-in. or ¼-in. steel pipe connected in suitable manner to a source of oxygen. For heavy work several cylinders of oxygen are connected together by means of a manifold. Pressure is controlled by a regulator on the manifold and a length of oxygen hose leads from the regulator to the steel pipe that forms the lance.

The oxy-acetylene cutting blowpipe was used to start the cut at one side. The oxygen lance was then brought into play to carry the cut down to the bottom of the 8-ft. mass. Meanwhile the blowpipe was moved along the line of cut on the top surface. The lance was then raised to pick up the blowpipe cut and again carry it to the bottom. This sequence of operations was continued until the cut was completed. The two pieces thus obtained were then cut into smaller pieces of such size that they could be placed in the furnace and remelted.

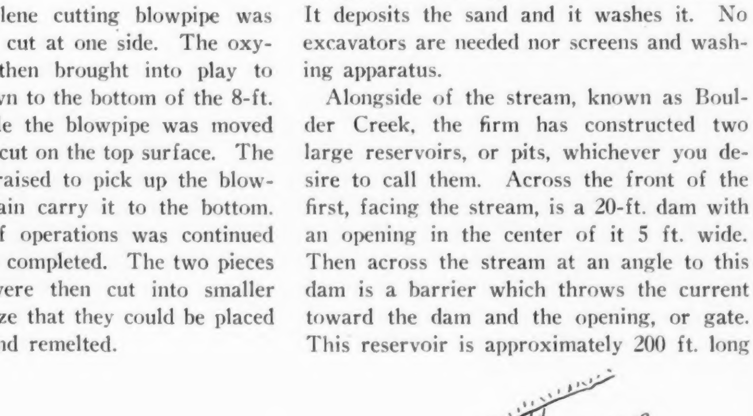
Sand and Gravel Firm Lets River Do the Work

By Willis Parker
Denver, Colo.

WHAT is said to be a rather unique sand and gravel pit is that of the firm of Kerr, Sherman and Callihan of Boulder, Colo., wherein the river is harnessed to the extent that it does all of the work with the exception of loading the sand into the trucks. It deposits the sand and it washes it. No excavators are needed nor screens and washing apparatus.

Alongside of the stream, known as Boulder Creek, the firm has constructed two large reservoirs, or pits, whichever you desire to call them. Across the front of the first, facing the stream, is a 20-ft. dam with an opening in the center of it 5 ft. wide. Then across the stream at an angle to this dam is a barrier which throws the current toward the dam and the opening, or gate. This reservoir is approximately 200 ft. long

Sketch illustrating plan of Boulder, Colo., sand pit, showing how river deposits the sand and washes it



and is best described as a settling pond into which the current brings in the sand and gravel and drops it owing to the reduction in the current.

At the rear of the reservoir is an opening back to the river so that the water, devoid of its sand burden, flows off, carrying with it some of the fine sediment and dirt.

Behind the first reservoir, or this settling pond, is a second, which is practically the same width, 20 ft., but some 600 ft. long. This is the real sand pit.

When the first pit has been filled with sand, the gate to the second is opened and the rush of water through the first pond picks up and carries the deposits of sand into the second, which has an outlet at the end for the removal of the water.

There is sufficient fall in the stream at this point, and in the levels of the two pits, to permit a heavy current to pass through the narrow gate and drag the sand with it.

"As soon as the first pond is filled with sand, we open the gate to the second and let the current pull that sand into the second," explained Mr. Callihan. "When the pond is emptied, we close the gates between the two of them and collect another pond full of sand, whereupon we open the gate again and draw it into the pit. It takes but a few hours to empty the collection basin, and, when the river is running high, it takes but a few hours to collect a basin full of sand for transfer into the permanent pit.

"Now we let the river wash the sand, too, by permitting water to pass over the sand deposits after they have been moved into the second basin. There is just enough current to pick up the sediment and carry it away without carrying off the good sand. We govern this by the height of the barrier at the end of the pit. This barrier is nothing more than a gate with slots into which we insert lengths of 2 x 4's. The higher we lift the barrier, the slower is the speed of the water, and therefore the finer is the sediment it picks up and removes.

"There is sufficient fall in the levels, and therefore enough 'drag' so that we can, if we desire, pull a load of sand from the first pit to the end of the second. We seldom need do this, however, for, by dropping the first load near the gates between the two ponds, we give it a second washing when the second load of sand comes through and is carried a little farther toward the end of the pit. The way we work it is to deposit the first load near the intersecting gate between the two ponds, and subsequent loads farther on so that each successive wave of passing water will not only pull the sand farther into the pit but will continue to clean and wash the sand that already has been deposited, until all of the fine sand and muck is collected at the very end of the pit. Even then, we can let the water pass over this and clean it up if we have to use it."

The second pit will accommodate from 2,000 to 3,000 cu. yd. of sand. When the river is running normally, it does not take long to get a pit full. It is refilled many, many times during a season.

There is a driveway right into the pit so that wagons and trucks may be backed into it, loaded by hand and pulled out with very little difficulty. Also, there is a small bin at the side of the pit with an endless chain of buckets to carry the sand to the bin where it flows down by gravity to the wagons and trucks below. A grating at the bottom of the chain permits a man with team and fresno or scraper, to drag the sand from all points of the pit to the grating and drop it down upon the elevating buckets.

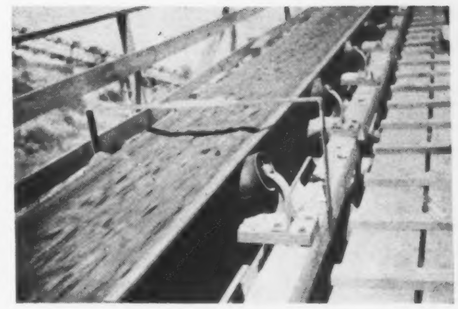
Practical Carrier for Fuse with Caps Attached

HERE is an interesting picture from the quarry workings of the Riverside Portland Cement Co., Riverside, Calif., from a recent issue of the *National Safety News*. It shows a serviceable leather carrier to provide for safety in transporting fuse and caps to the job. Carefully inserted as indicated in the picture, it is an easy matter to withdraw a single fuse as required; and the container protects the caps from flying rocks or other hazard.

Leather carrier for transporting fuse and caps to the job

Practical Safety-First Feature for Conveyor Belts

A SIMPLE means of keeping long conveyor belts from blowing off the rollers is shown in the accompanying illustration. All that is required is a piece of strap iron, about an inch in width, bent as shown and bolted to both sides of the conveyor framework. The piece crosses the belt about 6 in. above its upper surface so that it does not drag on the material. When these straps are spaced about 50 ft. apart on long conveyors they easily keep the belt in place no matter how exposed the conveyor is nor how windy the location.

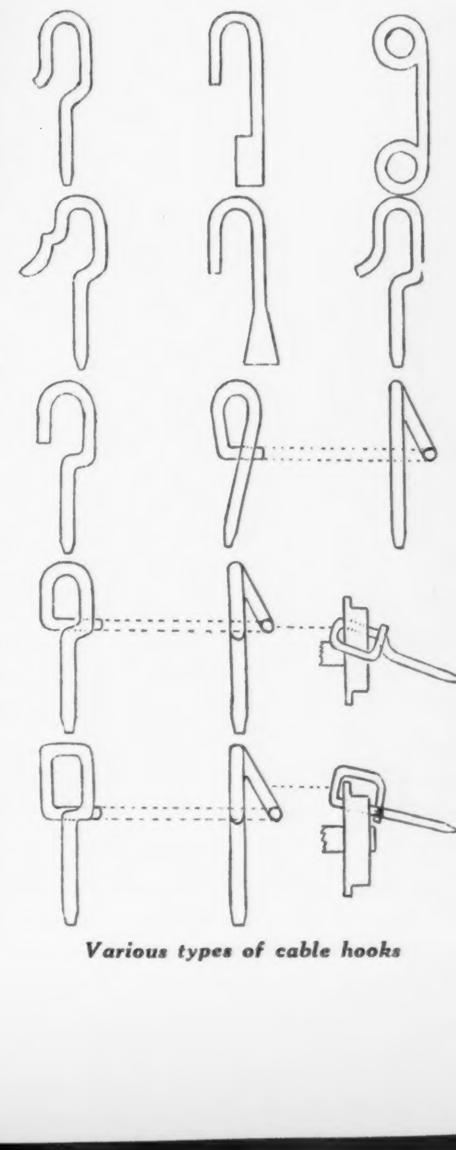


Strap iron protects conveyor belt

These pieces also serve another very important function, for they keep men from riding on the belts.

Hooks

THE SUBJECT of safety hooks for use on incline haulage cars apparently has received considerable attention in England, according to the *Quarry and Surveyors' and Contractors' Journal*, which calls attention to the large number of accidents due to runaway cars, which with ordinary care could nearly always be prevented. These accidents are very frequently caused through neglect to use "warricks," stop blocks and suitable hooks (scotches). Several types of such scotches are shown in the sketch given, the advantage claimed for most of them being that they are not liable to fall out of the wheels like the straight and ring scotches.



Various types of cable hooks

Franklin Limestone Co. Now Has Sand and Gravel Subsidiary

TO THE GROWING list of crushed-stone producers who have also gone into the sand and gravel business is added the Franklin Limestone Co., Nashville, Tenn., which recently put into operation the East Tennessee Sand and Gravel Co. This company has a new plant near Johnson City, Tenn., of a capacity of 1500 tons per day. Regarding the new plant the *Johnson City Chronicle* says:

One hundred and fifty tons of sand and gravel are now being produced every hour at the East Tennessee Sand and Gravel Co.'s plant on the Siam road one mile north of Elizabethton, according to officials of the company, who say they are highly pleased with operation of the new company in this section.

The East Tennessee Sand and Gravel Co., one of five subsidiaries in Tennessee of the Franklin Limestone Co. of Nashville, now has a gross investment, including machinery and other equipments and facilities amounting to about $150,000. Twenty-five men are employed and others are to be added as soon as the necessity demands.

Officials of the new company are Henry Rodes, of Nashville, president; R. R. Miller, of Johnson City, secretary and treasurer. Directors include: Mr. Rodes and Mr. Miller and Battle Rodes, Nashville; A. U. Givend, Covington, Tenn.; M. F. Miller, R. C. Campbell, Nashville.

Beginning of the new company has been marked by progress from the first and large orders have been received for much of the building operations now being conducted in this section.

Tijuana, Mexico, Now Has Rock-Crushing Plant

TIJUANA, just across the Mexican boundry from San Diego, Calif., has added a new industry, a complete rock-crushing plant, with more than $50,000 worth of machinery installed, on the outskirts of the city, along the road to Ensenada. The Peninsular Construction Co. of Tijuana, headed by Asuncion N. Vela, owner of the Santa Paula Rock Co. and the Santa Paula Pipe Works Co. of Santa Paula, Calif., with associates, all Mexicans, says that the plant will have a capacity of 600 tons daily and will care for the necessities of this material in the district.

"With this new industry established here, the government will exert every effort to protect it and stimulate it, encouraging all buyers of such material to acquire them from the new local firm," said Santiago Reachi, chief of the department of industries in the district government.

"Mr. Vela knows his business, is amply financed, has already installed his plant and is drilling a well large enough to supply all water needs, indicating that industries well financed and operated by men who understand their business are to be a complete success in the district."

The new plant is designed to produce concrete brick and is prepared to finance city construction work, such as sidewalks and paving.

Other members of the company are Arturo Cubillas and Alejandro Bustamente, both well known in Tijuana business circles. The entire equipment and machinery were purchased in the United States, mostly in California. "We shall require considerable more machinery for our plant in Ensenada," says Mr. Vela.—*San Diego* (Calif.) *Union.*

Tennessee Sand Company Considering Changing Location

THAT the Loudon Sand and Gravel Co. of Loudon, Tenn., will probably be moved to Chattanooga in the near future was reported in local business circles recently.

S. P. Dannel, president of the Loudon Co., was expected in Chattanooga to inspect a number of sites proposed for the location of his company.

In the event the company moves to Chattanooga it will be expanded. The present capitalization of $50,000 will be increased. It is said that Mr. Dannel is seeking a location near the Market street bridge.—*Chattanooga* (Tenn.) *News.*

Kansas Sand Producer Sues Contractor for Fulfillment of Contract

THE BROWNING SAND CO. of Lawrence, Kan., is plaintiff in a suit for $1,030.05 filed in Leavenworth county district court recently against Keplinger Brothers, contracting firm engaged in building the Tonganoxie cutoff.

R. H. Sphar and L. C. Browning in the action against H. W. and William Keplinger are seeking to recover the above amount over an alleged contract to furnish sand and gravel for the cutoff.

The petition alleges that a contract was entered into between the two concerns whereby the Browning Sand Co. was to furnish sand and gravel that would pass inspection by the Kansas State Highway commission at $2.25 per cu. yd. The copy of the contract is dated October 5, 1929.

It is further set out in the petition that the plaintiffs furnished 105 yd. of material on the contract worth $236.25, and were ready to deliver 588 yd., the full amount specified, which the defendants refused to accept.

It is alleged that Keplinger Bros. used the 105 yd. for the viaduct, but the plaintiffs say they were informed none of their material was used in the slab work on the cutoff.

Judgment for the full amount with costs of the action is asked by the plaintiffs.—*Lawrence* (Kan.) *Journal-World.*

Long Island Sand and Gravel Dredging Problem Gets Complicated

ACCORDING to records in the U. S. Engineer's Office in New York City, O'Brien Bros. Sand and Gravel Corp. has applied for a permit to dredge in Port Jefferson, Long Island, harbor to a depth of 35 ft. below mean water for commercial purposes.

A comparison of the map of the proposed area sought to be dredged by the O'Brien corporation shows that it is for the same territory which the Great Eastern Gravel Corp. has already applied to the Brookhaven trustees for a lease. The application by the Great Eastern Gravel Corp. for the lease created a great deal of excitement and ended in an injunction proceeding which has prevented the trustees from granting the lease. —*Port Jefferson* (N. Y.) *Echo.*

Illinois County Pays Royalty of 15c Per Yard for Gravel

A JURY which had been impanelled to try a suit by which the county is seeking to condemn gravel rights on the Fink estate near Manlius, Ill., was dismissed recently after attorneys had reached a tentative agreement by which the heirs are to receive 15c a yd. for all gravel taken off of the farm. The compensation is the same as that which is paid for gravel taken from other pits which have been opened in Bureau county.

By turning down an offer of $400 an acre for five acres of gravel deposits which were sought by the state aid road committee, the Fink heirs were successful in saving the land immediately surrounding the farm residence, and under the tentative agreement which has been ratified by all but two of the heirs, the gravel will be taken from more remote parts of the farm.—*Princeton* (Ill.) *Republican.*

At Least One Ohio Quarry Is Busy!

EVEN THOUGH July's production broke all records at the France Stone Co.'s North Baltimore (Ohio) plant and is expected to have been the zenith of this year's work, August so far has brought so many orders that the quarry was operated all day Sunday and overtime every day since.

Extra railroad cars which were brought here Saturday at 8 p. m. were filled by Sunday's production, some were shipped out early Sunday and others on Monday. The average daily railroad shipment has been about 25 cars in addition to many tons which go out on contractor's and township's trucks, but with most of the road work now under way the heavier part of the crushing season is said to be nearly over.—*North Baltimore* (Ohio) *Beacon.*

Editorial Comment

Economic Principles

One thing the present depression in business has done, for better or for worse, is to make all business men more familiar with the phraseology of economics. There can hardly be a business man left, however isolated, who can read, who has not read something about over-production, overcapacity, under-consumption, balancing production and consumption, basic price levels, price index, etc., etc. If business men have been confused with all this, it is obvious they are hardly more so than the economists themselves.

Therefore we welcome, and we believe our readers will welcome, the following paragraph from *Iron Age*, which comes as near to summing up the entire problem as anything we have read:

> Classic economic doctrine is that there can be no such thing as over-production of goods, for goods are exchanged for goods. A primitive community living on its own produce will merely supply its natural needs. If climatic conditions are adverse it may suffer from a deficiency of food, fiber and fuel; if, on the other hand, climatic conditions are favorable, the community may not have to work so hard to obtain its requirements. With the division of labor and the advent of trade, conditions gradually become more complicated, and with the present development of the world, they are extremely complex, so it may result in there being an over-production of some things. On the whole, however, the economic trouble is unbalance, not over-production.

The trouble is that economics (like business) cannot be entirely divorced from sentiment. This country contains practically the same amount of money (currency and credit) that it did in 1929. Only the sentiment regarding its use has changed. Through *fear* of losing income, business men and common men alike avoid any except expenditures they consider absolutely essential. Each contributes to the others' "hard times," just as by freely spending each contributes to the others' "good times."

Those rock products industries such as cement and aggregates, that supply construction materials for public works, do not suffer the same loss of business as industries which sell the consumer direct, like lime and gypsum, for example, chiefly because sources of public works expenditures are indirect (and collection in most cases postponed) so the taxpayer consumer is hardly aware that they are coming out of his pocket.

As soon as business men are heartened again by signs of a favorable "upturn," they invariably turn loose the flood of money and credit that has been dammed up by this sentiment of fear; and try to outdo each other in preparing for the business it brings. The absurdity of withholding the spending of money that you know must be spent to keep you in the running, until everyone else decides to spend money likewise, should be obvious. The really wise, shrewd business man is the one who spends his money now, when it will buy more, and gets the advantage of his competitors by being ready, while others are merely preparing to get ready "when and if."

Public Works Expenditures

While rock products producers of construction materials are congratulating themselves on the markets created by improvements and new construction of public works, they would do well to look ahead and see what the future has in store. It is inevitable that, easy as money comes for public works, the day will come when there will be strong public sentiment against a constantly increasing tax burden. As in the case of "hard times" and "good times," sentiment, unfortunately, plays fully as important a part as economics. Statistics and ascertainable facts make it possible to use economics in business; but the man is not born who can predict changes in public sentiment and their effect on economics and business.

Few of us realize how important public sentiment is to our individual businesses—in the final analysis. Take for example the growing public sentiment against war, accepted in the abstract by practically everyone. Yet when it comes to practically applying means to restrict or abolish war, such as cutting down army and naval expenditures, sentiment is no longer consistent. There are "big navy men" and "little navy men," we dare say, among the producers of rock products.

Here again sentiment overrides business sense and common sense, for it is almost certain that money saved from useless naval and army expenditures could be, and in all probability would be, spent in the construction of public works, and add to the profits of those who supply materials and labor for the construction of public works, not to mention adding to public happiness, welfare, health, safety and comfort. But again, as in the case of good times and bad times, *fear* is the underlying cause of our failure.

The average business man probably thinks it is a far cry from him and his business to the fostering or encouraging of sentiment looking toward permanent international peace. Yet the size of the expenditure for public works (and indirectly, through its influence, expenditures for all industry) in the next ten, twenty or more years may be the deciding factor in the success or failure of his business. Just as he spends or tries to spend the budget of his own family and his own business to the best advantage, every business man should try to use a part of his time and brains to see that the public's money is spent to the best ultimate advantage.

One has only to look at the figures of national, state and local government budgets to realize what a tremendous factor they are in the business world. They doubtless will become still larger factors, until public sentiment changes, if it does, and a wave of public economy, or a wave of indignation at dishonest and inefficient administration of public expenditures, sweeps the country. We who depend largely on public works expenditures, especially, should, as a plain matter of business, use our best energies toward honest and efficient public administration.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	8-27-30	85	....	
Alpha P. C. new com.[2]	8-23-30	24	25	50c qu. July 25
Alpha P. C. pfd.[2]	8-23-30	118	....	1.75 qu. Mar. 15
American Aggregates com.[29]	8-27-30	18	23	75c qu. Mar. 1
Am. Aggr. 6's, bonds	8-27-30	83	86	
American Brick Co., sand-lime brick	6-27-30	....	5	25c qu. Feb. 1
American Brick Co. pfd	8-25-30	60¼	....	50c qu. May 1
Am. L. & S. 1st 7's[29]	8-27-30	95	97	
American Silica Corp. 6½'s[49]	8-26-30	No market		
Arundel Corp. new com	8-25-30	43⅞	....	75c qu. July 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	8-26-30	No market		
Beaver P. C. 1st 7's[29]	8-22-30	95	98	
Bessemer L. & C. Class A[4]	8-22-30	29	32	75cqu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	8-22-30	92	94	
Bloomington Limestone 6's[29]	8-27-30	70	72	
Boston S. & G. new com.[47]	8-23-30	18	20	40c qu. Apr. 1
Boston S. G. new 7% pfd.[47]	8-23-30	47	50	87½c qu. Apr. 1
California Art Tile A	8-22-30	....	8	43¾c qu. Mar. 31
California Art Tile B	7-24-30	....	3	20c qu. Mar. 31
Calaveras Cement com	8-22-30	....	12	
Calaveras Cement 7% pfd	8-22-30	....	84	1.75 qu. July 15
Canada Cement com	8-25-30	13⅞	....	
Canada Cement pfd	8-25-30	94½	95	1.62½ qu. June 30
Canada Cement 5½'s[43]	8-22-30	100	100½	
Canada Cr. St. Corp. bonds[43]	8-22-30	96	96¾	
Certain-teed Prod. com	8-25-30	6¾	7	
Certain-teed Prod. pfd	8-25-30	25	29⅛	1.75 qu. Jan. 1
Cleveland Quarries	8-25-30	60	....	75c qu. 25c ex. Sept.1
Columbia S. & G. pfd	8-26-30	90	94	
Consol. Cement 1st 6½'s, A	8-26-30	80	90	
Consol. Cement 6½% notes	8-26-30	70	75	
Consol. Cement pfd.[29]	8-27-30	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	8-22-30	99	101	
Consol. Rock Prod. com.[44]	8-21-30	1¾	2¼	
Consol. Rock Prod. pfd.[44]	8-21-30	9½	10	43¾c qu. June 1
Consol. Rock Prod. units	8-23-30	19	23	
Consol. S. & G. pfd. (Can.)	8-25-30	83	85	1.75 qu. Aug. 15
Construction Mat. com	8-22-30	14½	15	
Construction Mat. pfd	8-22-30	40¼	....	87½c qu. Aug. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	8-21-30	90	95	
Coosa P. C. 1st 6's[29]	8-27-30	50	55	
Coplay Cem. Mfg. 1st 6's[40]	8-23-30	95	....	
Coplay Cem. Mfg. com.[40]	8-23-30	10	....	
Coplay Cem. Mfg. pfd.[40]	8-23-30	60	....	
Dewey P. C. 6's (1942)[30]	8-26-30	100½	....	
Dewey P. C. 6's (1930)[30]	8-26-30	100½	....	
Dewey P. C. 6's (1931-41)[30]	8-26-30	100½	....	
Dolese & Shepard	8-25-30	75	80	$2 qu. July 1
Dufferin Pav. & Cr. Stone com.	8-25-30	....	16	
Dufferin Pav. & Cr. Stone pfd.	8-25-30	84½	....	1.75 qu. July 2
Edison P. C. com.[29]	6-28-30	10c	....	
Edison P. C. pfd.[29]	6-28-30	25c	....	
Giant P. C. com.[2]	8-23-30	5	15	
Giant P. C. pfd.[2]	8-23-30	15	25	1.75 s.-a. June 16
Gyp. Lime & Alabastine, Ltd.	8-25-30	19⅛	19¼	37½c qu. July 2
Hermitage Cement com.[11]	8-25-30	30	35	
Hermitage Cement pfd.[11]	8-25-30	86	90	
Ideal Cement, new com	8-25-30	50	52	75c qu. July 1
Ideal Cement 5's, 1943[33]	8-25-30	98	100	
Indiana Limestone units[29]	8-27-30	....	80	
Indiana Limestone 6's	8-25-30	75	....	
International Cem. com	8-23-30	65½	66¾	$1 qu. Sept. 30
International Cem. bonds 5's	8-25-30	101⅞	102	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	8-22-30	95	....	
Kelley Is. L. & T. new st'k	8-25-30	37	39	62½c qu. July 1
Ky. Cons. St. com. V. T. C.[48]	8-21-30	8½	10	
Ky. Cons. Stone 6½'s[48]	8-21-30	93	95	
Ky. Cons. Stone pfd.[48]	8-21-30	87	[illegible]	1.75 qu. Aug. 1
Ky. Cons. Stone com.[48]	8-21-30	8½	10	
Ky. Rock Asphalt com.[11]	8-25-30	12½	14	40c qu. July 1
Ky. Rock Asphalt pfd.[11]	8-25-30	75	83	1.75 qu. Sept. 1
Ky. Rock Asphalt 6½'s[11]	8-25-30	98	100	
Lawrence P. C.	8-23-30	59	64	$1 qu. June 28
Lawrence P. C. 5½'s, 1942[2]	8-23-30	85½	....	
Lehigh P. C.	8-25-30	30	32	62½c qu. Aug. 1
Lehigh P. C. pfd	8-25-30	105	107	1¾% qu. Oct. 1
Louisville Cement[18]	8-25-30	250	....	
Lyman-Richey 1st 6's, 1932	8-22-30	97	99	
Lyman-Richey 1st 6's, 1935	8-22-30	96	99	
Marblehead Lime 6's[14]	8-22-30	95	100	
Marbelite Corp. com. (cement products)	8-22-30	200	....	
Marbelite Corp. pfd	8-22-30	12	....	50c qu. July 10
Material Service Corp	8-22-30	19	....	50c qu. Sept. 1
McCrady-Rogers 7% pfd.[22]	8-21-30	50	....	
McCrady-Rogers com.[22]	8-21-30	20	20½	
Medusa Portland Cement	8-25-30	....	93	1.50 July 1
Mich. L. & C. com.[6]	8-8-30	23	....	
Missouri P. C.	8-25-30	29	29½	50c qu. Aug. 1
Monolith Portland Midwest	8-23-30	3		
Monolith bonds, 6's[9]	8-21-30	80	85	
Monolith P. C. com	8-23-30	3½	5	40c s.-a. Jan. 1
Monolith P. C. pfd	8-23-30	4	6	40c s.-a. Jan. 1
Monolith P. C. units[9]	8-21-30	12½	15	
National Cem. (Can.) 1st 7's[43]	8-22-30	99½	....	
National Gypsum A com	8-25-30	4	6	
National Gypsum pfd	8-25-30	28	31	
Nazareth Cement com.[26]	8-22-30	22	....	
Nazareth Cement pfd.[26]	8-22-30	100	....	
Newaygo P. C. 1st 6½'s[29]	8-27-30	100¾	....	
New Eng. Lime 1st 6's[14]	8-22-30	70	75	
N. Y. Trap Rock 1st 6's	8-22-30	101	....	
N. Y. Trap Rock 7% pfd.[36]	8-8-30	95	....	1.75 qu. Apr. 1
North Amer. Cem. 1st 6½'s	8-22-30	59¼	60⅞	
North Amer. Cem. com.[29]	8-27-30	3	5	
North Amer. Cem. 7% pfd.[29]	8-27-30	21	25	
North Amer. Cem. units[29]	8-27-30	23½	27	
North Shore Mat. 1st 5's[15]	8-26-30	95		
Northwestern States P. C.[37]	8-23-30	115	....	$2 Apr. 1
Ohio River Sand com	8-25-30	15	17	
Ohio River Sand 7% pfd	8-25-30	97	98	
Ohio River S. & G. 6's[16]	8-8-30	85	90	
Oregon P. C. com.[20]	8-22-30	9	14	
Oregon P. C. pfd.[20]	8-22-30	90	93	
Pacific Coast Aggregates com.	8-23-30	5	10	
Pacific Coast Cement 6's[5]	8-21-30	75¼	76½	
Pacific P. C. com	8-22-30	15	19	
Pacific P. C., new pfd	8-22-30	70	75	1.62½ qu. July 5
Pacific P. C. 6's	8-21-30	99	....	
Peerless Cement com.[1]	8-22-30	7¾	8¼	
Peerless Cement pfd.[1]	8-22-30	75	79	1.75 Apr. 1
Penn.-Dixie Cement pfd	8-25-30	45	50	
Penn.-Dixie Cement com	8-25-30	6½	7½	
Penn.-Dixie Cement 6's	8-25-30	82	....	
Penn. Glass Sand Corp. 6's	8-6-30	102	104	
Penn. Glass Sand pfd	8-6-30	105	....	1.75 qu. July 1
Petoskey P. C.	8-25-30	8¾	9¼	15c qu. Apr. 1
Port Stockton Cem. units[9]	2-17-30	....	30	
Port Stockton Cem. com.[9]	8-21-30	No market		
Riverside Cement com	8-22-30	12	14	
Riverside Cement pfd.[20]	8-22-30	73	75	1.50 qu. Aug. 1
Riverside Cement, A[20]	8-22-30	12	14	31¼c qu. Aug. 1
Riverside Cement, B[20]	8-22-30	2	....	
Roquemore Gravel 6½'s[11]	8-25-30	99	100	
Santa Cruz P. C. 1st 6's, 1945[5]	8-21-30	105	....	6% annually
Santa Cruz P. C. com	8-22-30	90	....	$1qu. July 1
Schumacher Wallboard com	8-22-30	9	10½	
Schumacher Wallboard pfd	8-22-30	19	21¼	50c qu. Aug. 15
Southwestern P. C. units[44]	8-21-30	240		
Standard Paving & Mat. (Can.) com	8-25-30	18	20½	50c qu. May 15
Standard Paving & Mat. pfd	8-25-30	86½	88	1.75 qu. Feb. 15
Superior P. C., A	8-22-30	34	36⅞	27½c mo.Sept. 1
Superior P. C., B	8-22-30	10½	12	25c qu. Mar. 20
Trinity P. C. units[37]	8-23-30	130	140	
Trinity P. C. com.[37]	8-23-30	30	....	
Trinity P. C. pfd.[29]	8-27-30	110	120	
U. S. Gypsum com	8-25-30	43	43¼	40c qu. Sept. 30
U. S. Gypsum pfd	8-25-30	125	....	1.75 qu. Sept. 30
Universal G. & L. com.[3]	8-26-30	No market		
Universal G. & L. pfd.[3]	8-26-30	No market		
Universal G. & L., V. T. C.[3]	8-26-30	No market		
Universal G. & L. 1st 6's[3]	8-26-30	No market		
Warner Co. com.[16]	8-23-30	39	40	50c qu. & 25c ex. July 15
Warner Co. 1st 7% pfd.[16]	8-23-30	95	105	1.75 qu. July 1
Warner Co. 1st 6's	8-26-30	97	99	
Whitehall Cem. Mfg. com.[36]	8-8-30	80	....	
Whitehall Cem. Mfg. pfd.[36]	8-8-30	50	....	
Wisconsin L. & C. 1st 6's[15]	8-26-30	95	....	
Wolverine P. C. com	8-25-30	4¼	4½	15c qu. May 15
Yosemite P. C., A com.[20]	8-22-30	2¼	2¾	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett. New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Beadling & Co., Youngstown, Ohio. [5]Smith, Camp & Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simon & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Consolidated Cem. com. v.t.c., 3220 shs.[1]	1⅛ per share	....
Universal Gypsum and Lime, 300 shs.[3]	$4 for the lot	....
Universal Gypsum and Lime, 200 shs.[3]	$2 for the lot	....
Holliston Trap Rock Co. com.,[2] 67 sh., per sh.	35	....

[1]Price at auction by Wise, Hobbs & Anold, Boston, Dec. 18, 1929. [2]Price at auction by R. L. Day & Co., Boston, July 16, 1930. [3]Price at auction by Adrian H. Muller & Son, New York, Aug. 6, 1930.

Atlantic Gypsum Products Co. Postpones Interest Payments

THE Atlantic Gypsum Products Co., Boston, Mass., has decided to postpone temporarily interest payment due August 1, 1930, on its debenture 6s due 1944. Under terms of the indenture a six months' grace period is allowed before non-payment of interest shall constitute a default.

In a letter to debenture holders the company stated that the annual audit, as provided under the indenture, to determine the amount which is to be treated as applicable to payment of interest on the debentures revealed that $89,247 was so applicable for the year 1929 or substantially 6% upon the debentures. It should be understood, however, that the foregoing does not mean that the company had any net earnings available for payment of debenture interest. The amount treated as available for the purpose of the audit is merely a fixed amount per ton of rock shipped from the quarries, regardless of operating results.

The company further stated that as a matter of fact, although quarrying operations were extensive, the company's operations as a whole were not profitable, but resulted in a heavy loss due chiefly to the severe competitive conditions. As a result the company has not been able as yet to pay the interest which fell due June 1, 1930, upon its first mortgage bonds.

Warner Companies Retiring Some of Bond Issues

THE Tradesmen's National Bank and Trust Co., Philadelphia, Penn., trustees, on August 27 invited bids for the sale to it of first mortgage 6% sinking fund bonds of the Warner Co., dated April 1, 1929, to an amount sufficient to exhaust $105,000 at prices not exceeding 105 and interest.

The Bankers Trust Co., New York City, trustee, will on August 26 invite bids for the sale to it of first mortgage sinking fund gold bonds of the American Lime and Stone Co., dated April 1, 1932, to an amount sufficient to absorb $36,942, at prices not exceeding 105½.

New West Coast Phosphate Manufacturer

THE Agricultural Potassium-Phosphate Co. of California, Ltd., which has been in the process of formation for the past several months, has purchased the former American Potash and Chemical Co. plant at Los Angeles Harbor for $600,000.

The company, a $1,000,000 organization, will manufacture commercial fertilizer and a number of relative products, the principal substance to be manufactured under the Kreiss patented process. The local plant will have an annual capacity of 40,000 tons, and provisions are now under way for the future installation of additional units which will increase the annual capacity to 100,000 tons.

In addition to the plant the company recently purchased a phosphate mine and equipment in the southeastern Idaho fields, near Paris, Idaho, along the Union Pacific System. It is reported that the mine contains a deposit of highest average grade phosphate rock in the United States. A recent government geological survey indicates it contains more than 9,000,000 tons of this rock. The main plant and office will be located in the Los Angeles Harbor district.

New Stock Offering

THE Tennessee Marble and Brick Co., Inc., Fayetteville, Tenn., is offering through S. L. Waitzfelder and Clark, Salomon and Co., New York City, 49,000 shares of capital stock. The total authorized number of shares is 100,000, no par; of these 73,000 are to be presently outstanding. The transfer agent and registrar is the Security Transfer and Registrar Co., New York City.

Business—Incorporated in Tennessee to develop crystallized limestone (marble) deposits on property located near Flintville, Tenn.

Officers and Directors—G. A. Jarvis, president; J. W. Holman, vice-president; R. W. Gaunt, secretary-treasurer; J. E. Caldwell, E. H. Jones, T. A. Patrick and C. A. Gleghorn.

Pro Forma Balance Sheet, as of July 22, 1930 (giving effect to present financing, etc.):

Assets:	
Property and equipment	$6,838,492
Current assets:	
Cash	344,368
Inventory	6,000
Deferred charges	25,632
Total	$7,214,492
Liabilities:	
Capital stock (represented by 73,000 no par shares	$7,179,092
Current liabilities:	
Accounts and notes payable	35,400
Total	$7,214,492
Current assets	$ 350,368
Current liabilities	35,400
Working capital	$ 314,968

Bessemer Cement Earnings

THE Bessemer Limestone and Cement Co., Youngstown, Ohio, for the six months ended June 30, 1930, reports net earnings available for interest, after depreciation and depletion, equivalent to 2.81 times interest charges on its outstanding first mortgage bonds. Net, after federal taxes, was $114,321, or $2.28 per share on the outstanding class A stock; six months dividends on the class A stock amount to $1.50 per share.

Dewey Bonds Called

FIRST mortgage 6% bonds, "A," 1931-42, of the Dewey Portland Cement Co., in the amount of $279,500, have been called at 103½, as of October 1.

Southern Asbestos Co. Balance Sheet

THE SOUTHERN ASBESTOS CO., Charlotte, N. C., reports a balance sheet as of June 30 as follows:

ASSETS	1930	1929
*Plant and equipment	$ 474,447	$ 502,740
Processes, formulas, etc.	518,000	518,000
Investment	19,950	19,950
Current assets:		
Notes receivable	700,000	....
Cash and accounts	102,156	358,187
Materials and supplies	448,437	506,687
Deferred charges	5,105	2,988
Total	$1,568,095	$2,608,552
LIABILITIES		
Cancellation of contracts	$ 40,336	....
Current liabilities:		
Accounts payable, etc.	4,871	$ 13,799
Salaries and wages	3,765	7,685
Credit balance (accounts receivable)	41,113	351,830
Federal taxes	4,057	
Reserve for contingencies	50,000	....
Total	$1,568,095	$2,608,552
Current assets	$ 550,593	$1,564,874
Current liabilities	53,806	373,314
Working capital	$ 496,787	$1,191,560

*Less depreciation: 1930, $101,345; 1929, $68,757. †Represented by no-par shares: 1930, 89,960; 1929, 99,960.

Company had an operating profit of about $38,000 in 1930, but there was an inventory shrinkage of $295,000 charged against surplus.

Pacific Coast Co. Quarterly Earnings

THE PACIFIC COAST CO., Seattle, Wash., which controls Pacific Coast Cement Co. and other properties in Oregon, Washington and Alaska, reports for the quarter ended June 30 profit of $8278, after expenses, as compared with $101,943 in the preceding quarter and $51,580 in the second quarter of 1929. The six months' profit was $110,221, after expenses, against $215,242 in the like period last year.

The following table shows the comparison of profits:

Quarter ended June 30:

	1930	1929
Gross	$1,044,254	$1,136,485
Profit after expenses	8,278	51,580
Six months' gross	2,265,383	12,298,915
Profit after expenses	110,221	215,242

Virginia Alberene Corp. Six Months' Statement

THE Virginia Alberene Corp., New York City, producers and manufacturers of Virginia soapstone and talc products, reports for the six months ending June 30:

	1930	1929
Net sales	$853,040	$863,461
Operating expenses	759,044	772,480
Depreciation and depletion	37,819	36,324
Net operating profit	56,177	54,657
Other income	26,577	27,731
Total income	82,754	82,388
Interest charges, etc.	64,438	56,052
Net profit	$ 18,316	$ 26,336

Recent Dividends Announced

Canada Paving and Supply, Ltd., 1st pfd. (qu.)	$1.75	Sept. 1
Gypsum Lime and Alabastine, Ltd. (qu.)	0.37½	Oct. 1
Indiana Limestone pfd. (qu.)	1.75	Sept. 1
International Cement (qu.)	1.00	Sept. 30
Kentucky Rock Asphalt pfd. (qu.)	1.75	Sept. 1

Program for International Road Congress

OFFICIAL delegates from 50 countries in all parts of the world have announced that they will attend the Sixth Congress of the Permanent International Association of Road Congresses which will open in Washington on Monday, October 6, and close on Saturday, October 11. Large delegations are expected from England, France, Germany, and Italy, and it is possible that some of these delegations may include as many as 100 engineers. Smaller delegations from other countries, including those as far distant as China, India, and Australia, will make the total attendance large.

This is the first such congress ever to be held outside of Europe, and it is believed that it will be the largest and most important gathering of highway engineers ever held. Contributing to this end, there is now a world-wide interest in highway transportation and a desire by foreign engineers to inspect the methods of construction and the results which have been attained in the United States. The delegations will include the most influential and representative of foreign highway engineers.

In preparation for the congress, 69 papers from engineers in 20 different countries are being published and will be received by the members of the congress before they start for Washington. These papers deal with the following subjects, which have been included in the agenda of the congress.

FIRST SECTION

Construction and Maintenance

First question: Results obtained by the use of—
(a) Cement.
(b) Bricks or other artificial paving.
(Methods employed for road construction and maintenance in these materials.)

Second question: The most recent methods adopted for the use of tar, bitumen, and asphalt in road construction.

Third question: The construction of roads in new countries, such as colonies and undeveloped regions.

SECOND SECTION

Traffic and Administration

Fourth question: Ways and means of financing highways:
(a) Road construction.
(b) Maintenance.

Fifth question: Highway transport: Correlation and coordination with other methods of transport; adaptation to collective (organizations) and individual uses.

Sixth question:
1. Traffic regulation in large cities and their suburbs; traffic signals; design and layout of roads and adaptation to traffic requirements in built-up areas.
2. Parking and garaging of vehicles.

The reports on each question have been reviewed by a general reporter (two general reporters for first question), and these general reports will be read at the meeting of the congress, followed by open discussion and adoption of conclusions. It is the custom to appoint general reporters from the country in which the congress is held, and the following authorities of recognized standing are acting in this capacity: Question 1, part (*a*), Frank T. Sheets, chief highway engineer, Illinois Department of Public Works; question 1, part (*b*), P. J. Freeman, chief engineer, bureau of tests and specifications, department of public works, Allegheny county, Pittsburgh, Penn.; question 2, Roy W. Crum, director, highway research board, National Research Council, Washington, D. C.; question 3, Edwin W. James, chief, Division of Highway Transport, Bureau of Public Roads, United States Department of Agriculture, Washington, D. C.; question 4, A. B. Barber, manager, transportation and communications department, Chamber of Commerce of the United States of America, Washington, D. C.; question 5, Henry R. Trumbower, professor of economics, University of Wisconsin, Madison, Wis., and question 6, Miller McClintock, director, Albert Russel Erskine Bureau for Street Traffic Research, Harvard University, Cambridge, Mass.

Program of the Congress

The American Organizing Commission has announced the following program:

Monday, October 6

Morning: Meeting of Permanent International Commission. Registration of delegates.
Afternoon: First plenary session—opening of congress—Constitution hall.
Evening: No formal engagement

Tuesday, October 7

Morning: Section meetings.
Luncheon: American Road Builders' Association.
Afternoon: Official opening of International Exposition of American Road Builders' Association.
Evening: Visits to International Exposition.

Wednesday, October 8

Morning: Section meetings.
Afternoon: Section meetings.
Evening: Official reception.

Thursday, October 9

Morning: Section meetings.
Afternoon: Second plenary session for discussion of conclusions.
Evening: American Organizing Commission dinner.

Friday, October 10

Morning: Inspection trip to experiment station of the United States Bureau of Public Roads at Arlington, Va.
Luncheon: Picnic luncheon, auspices of American Organizing Commission, at Mount Vernon, Va.
Afternoon: Inspection of construction of Mount Vernon Memorial Highway and visit to Mount Vernon (the home of George Washington).
Evening: Official closing of the congress and reception.

Saturday, October 11

Morning: Inspection of United States Naval Academy at Annapolis, Md., under auspices of American Organizing Commission.
Luncheon: Reception and luncheon tendered by the Hon. Albert C. Ritchie, governor of Maryland.
Afternoon: Recreation.
Evening: No formal engagement.
Note.—The necessity may arise for certain modifications in the program as here given.

Participation in all official excursions and social functions will be by ticket, which will be issued without charge to all delegates from other countries and to official delegates from the United States.

The congress is being held in this country at the invitation of the United States government and arrangements are being made by the American Organizing Commission with headquarters at 1723 N street, N.W., Washington.

Participation in the proceedings of the congress and receipt of the reports to the congress and the printed proceedings of the congress are possible only through membership in the congress. A temporary membership carrying these privileges may be had upon application to the American Organizing Commission at the above address. The fee for such membership is $5.

Simultaneously with the congress, an international road machinery and materials exhibition and demonstration will be held by the American Road Builders Association. The exhibition will be held in the Washington Auditorium, while the demonstration grounds where machinery may be seen in operation will be provided at a nearby point.

Fire Destroys Eau Claire Sand and Gravel Plant

THE *Eau Claire* (Wis) *Telegram* of August 18 contains the following:

"With two engines of the Eau Claire fire department held helpless by the lack of water, the Eau Claire Sand and Gravel Co. plant, just inside the southern limits of the city on highway 37, burned to the ground Saturday evening in a spectacular blaze that attracted thousands of persons from miles around.

"A. Owen Ayres, president and general manager, estimated today that the loss would be around $100,000. The plant cost more than that originally, he said, but with depreciation was probably valued at around that figure at the present time.

"Blanket insurance was carried protecting the owners up to 90% of the true value of the property.

"Other officers of the company are Mrs. A. O. Ayres, vice-president, and E. G. Hoeppner, secretary and treasurer.

"No plans had been formulated today as to whether or not the plant would be rebuilt, but Mr. Ayres stated it would probably be rebuilt.

"One large machine and a garage appeared today to be the total salvage from the fire.

"Plans for clearing up the ruins were made today and tomorrow a large crane will be brought down from the plant at Chippewa Falls to be used in cleaning purposes and in handling orders. Mr. Ayres stated today that there is sufficient material on hand to take care of all orders and to handle any new business.

"'Thus the company will be doing business as usual by Monday in spite of loss of the plant,' Mr. Ayres said.

"The fire, of unknown origin, started about 6:30 o'clock in the coal bin on the north end of the buildings. Fanned by a southwest wind, the flames spread swiftly to the wooden framework of the 'wet plant,' and consumed a flat car of the Chicago and Northwestern line, which was standing on the tracks adjoining the plant.

"The steam shovel, used to dig gravel from the pit, became so hot that it collapsed in a shower of sparks, starting a small grass fire along the highway a few hundred feet away. A larger water tank above the wet plant toppled with a crash during the conflagration.

"A switch engine sent from the Milwaukee yards managed to save six other flat cars, but the spreading flames prevented the crew from hauling the seventh out of danger."

British Columbia Quarry Gets Big Order for Breakwater Stone

CONTRACT for completion of the great jetty which will extend from Steveston five miles into the Gulf of Georgia, on the south arm of the Fraser river, British Columbia, has been awarded by the federal department of public works to Coast Quarries, Ltd., Vancouver, B. C., at a cost of approximately $425,000.

Announcement of this was made recently by W. A. Bickell, managing director of the firm. Within a week, he states, his company will commence work on the last section of the channel protection structure. He estimates that it will take between one and two years to complete the work and give employment to nearly 100 men.

This last section of the jetty will project 8000 ft. beyond the sections already completed and will finally extend the wall marking the channel almost five miles out from the shoreline at Steveston.

The jetty keeps the channel clear of sand and silt. Plans are now under way to confine the southern boundaries of the passageway by a similar structure.

The method of building the wall consists of shipping rock from the quarries near Pitt river on patented barges down to the line of the jetty and dumping there. These "dumping scows," as they are called, were specially designed by Mr. Bickell for this work and have greatly simplified the task of handling material.—*Vancouver* (B. C.) *Province*.

Iowa's Highway Materials Produced Mostly in Iowa

FRED R. WHITE, chief engineer of the Iowa state highway commission, announced recently that 485,134 tons of sand, crushed stone and gravel has been purchased by the commission for paving work in Iowa since January 1.

Of this, 156,135 tons of such material were purchased from the Lyman-Richey Sand and Gravel Co. of Omaha, Neb., but all the rest was purchased from material producers in Iowa.

"It should be understood that on a large percentage of paving work the contractor furnishes his own material," he said. "On only a relatively few jobs has the state purchased material directly."

The commission has purchased 2,777,837 bbl. of cement. Of these, 426,097 bbl. have been purchased from companies outside Iowa.

Approximately 15.3% of cement contracts let by the commission have gone to out of state mills and the remaining 84.7% of these contracts have gone to Iowa mills.

"Cement companies within this state sell a considerable quantity of cement outside Iowa," he pointed out. "Last year, I believe, one of the Mason City mills sold more than half of its cement outside the state. If the highway commission should adopt a policy of refusing to award a contract to any out of state mill, highway officials of neighboring states might very properly adopt a similar policy to exclude Iowa mills from their cement purchases."—*Des Moines* (Ia.) *Tribune-Capital*.

Exhibit of Illinois Minerals

THE WESTERN SOCIETY OF ENGINEERS, Chicago, Ill., in conjunction with the Illinois State Geological Survey, will exhibit September 2 to 12, 1930, scientific data accumulated during the 25 years' existence of the state geological survey. The exhibit will be at the headquarters of the Western Society of Engineers, 12th floor, Engineering Building, 205 W. Wacker Drive, Chicago, from 10 a. m. to 4:30 p. m. daily, except Sunday.

There will be a series of discussion conferences directed by Dr. M. M. Leighton, chief of the state geological survey. Those of most interest to rock products producers are: September 4, "Combustion data for buyers and users of coal"; September 8, "Fluorspar, limestone, dolomite, silica, molding sands, triopli, ochre and fuller's earth in metallurgical, chemical and agricultural industries"; September 9, "Stone, sand and gravel aggregate, exterior and interior building stone, ceramic clays, lime- and cement-making materials in the building industry." These conferences will be held at 2 p. m. each day as noted.

There will be four popular evening lectures on various phases of geology by well-known geologists.

Admission to exhibit and lectures is by card, which can be obtained by writing to E. S. Nethercut, director, Western Society of Engineers.

In view of ROCK PRODUCTS' frequent advocacy of producers in this industry taking more interest in geology, the editors urge all who are or will be near Chicago during the week September 2 to 12, to attend. We are sure they would be more than welcome.

New Missouri Sand and Gravel Operation

THE C. E. Rupprecht Co. of St. Louis, Mo., is engaged at the present time in establishing a sand plant and depot in Jefferson City, Mo.

The Rupprecht company's steamer and four large barges arrived there recently and the new plant will be located just east of the local sand company. Work will get under way at once and the plant will be operated at top capacity.

The plant will supply sand for the Bagnell dam and also for the state, having secured large contracts from each.

The local sand company is also operating at full blast at the present time.—*Jefferson City* (Mo.) *News*.

Tariff Commission Starts Investigation of Cost of Cement Making

HEREWITH is a copy of a public notice issued August 14 by the United States Tariff Commission designed to notify all interested parties of an investigation it is to conduct under the provisions of the new 1930 tariff act, of the cost of producing portland and other hydraulic cements:

"The United States Tariff Commission on this 14th day of August, 1930, under and by virtue of the powers granted by law and pursuant to the rules and regulations of the Commission, and in accordance with Senate Resolution No. 295, 71st Congress, 2d Session, hereby approves the following form of order of the investigation voted on June 20, 1930, for the purposes of Section 336 of Title III of the Tariff Act of 1930, of the differences in costs of production of, and of all other facts and conditions enumerated in said section with respect to, the articles described in paragraph 205 (b) of Title I of said tariff act: namely,—

"Roman, portland, and other hydraulic cement or cement clinker, being wholly or in part the growth or product of the United States, and of and with respect to like or similar articles wholly or in part the growth or product of competing foreign countries.

"Ordered further, that all parties interested shall be given opportunity to be present, to produce evidence, and to be heard at a public hearing in said investigation to be held at the office of the Commission in Washington, D. C., or at such other place or places as the Commission may designate, on a date hereafter to be fixed, of which said public hearing prior public notice shall be given by posting the notice thereof for thirty days at the office of the Commission in the City of Washington, D. C., and at the office of the Commission at the Port of New York and by publication once each week for two successive weeks in 'Treasury Decisions' published by the Department of the Treasury, and in 'Commerce Reports' published by the Department of Commerce, copies of which said publications are obtainable from the Superintendent of Documents of the government printing office in Washington, D. C.

"And ordered further, that public notice of said investigation shall be given by posting a copy of this order for 30 days at the principal office of the Commission in the City of Washington, D. C., and at the office of the Commission at the Port of New York, and by publishing a copy of this order once a week for two successive weeks in said 'Treasury Decisions' and in said 'Commerce Reports'."

Find Artinite in Liguria

ARTINITE, $MgCO_3 \cdot Mg(OH)_2 \cdot 3H_2O$, in almost a pure state, has been found in a mine at Mt. Ramazzo in Liguria, Italy.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
Distrcit	July 26	Aug. 2	July 26	Aug. 2
Eastern	3,416	3,343	12,742	12,861
Allegheny	2,794	2,961	9,516	9,585
Pocahontas	706	573	1,936	1,750
Southern	620	630	8,665	8,980
Northwestern	1,274	875	9,931	9,598
Central Western	488	487	12,142	12,490
Southwestern	567	560	8,500	7,406
Total	9,865	9,429	63,432	62,670

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

	Limestone Flux		Sand, Stone and Gravel	
	1929	1930	1929	1930
	Period to date		Period to date	
District	Aug. 3	Aug. 2	Aug. 3	Aug. 2
Eastern	99,129	86,879	283,493	217,814
Allegheny	105,465	82,274	187,660	175,967
Pocahontas	11,513	13,642	25,816	34,879
Southern	15,894	20,045	263,099	230,310
Northwestern	31,752	28,349	162,207	142,056
Central Western	15,709	14,236	291,400	286,402
Southwestern	14,073	13,462	188,598	192,224
Total	293,535	258,887	1,402,273	1,279,652

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	1930
Limestone flux	***293,535***	***258,887***
Sand, stone, gravel	***1,402,273***	***1,279,652***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of August 23:

CENTRAL FREIGHT ASSOCIATION DOCKET

25867. To establish on **lime**, carloads, minimum weight 30,000 lb., from Mitchell, Ind., to Waterloo, Ill., for E. St. L. C. & W. Ry. delivery, rate of 16c. Present—Combination rates.

25872. To establish on **crushed stone**, carloads (See Note 3), from Calcite, Mich. (near Rogers City), to Milwaukee, Wis., rate of $2.02 per ton of 2000 lb. Present—$5.50 per ton of 2000 lb.

25894. To establish on **sand and gravel**, carloads, Troy, Ohio, to Mortimer, Ohio, rate of $1.05 net ton. Present, 15c.

25895. To establish on **sand and gravel**, carloads, Allison Branch, Ill., to Putnamville, Ind., rate of $1.20 net ton. Present, 15c.

25896. To establish on **crushed stone**, carloads, Monon, Ind., to Michigan City, Ind., rate of 80c net ton. Present, 88c net ton.

25897. To establish on **sand and gravel**, carloads, Lafayette, Ind., to Michigan City, Ind., rate of 85c net ton. Present, 95c net ton.

25902. To establish on **sand, viz.: Lake, river and bank** other than sand loam, carloads, from Calumet, Gary and Willow Creek, Ind., to Crown Point, Ind., rate of $1.13 net ton. Present, 11.5c per 100 lb.. Route, via Wabash Ry., Chicago, Ill., and P. R. R.

25905. To establish on **sand and gravel**, carloads, actual weight will apply, Hugo, O., to Ravenna, O., rate of 60c per ton of 2000 lb. Present—Classification basis.

25908. To establish on **crushed stone and crushed stone screenings**, carloads, Huntington, Ind., to Claypool and Warsaw, Ind., rate of 80c, to Leesburg, Ind., 85c, to Milford Junction and New Paris, Ind., 90c and to Goshen, Ind., 95c per ton of 2000 lb. Present, $1 to Claypool and Warsaw, Ind.; $1.05 to Leesburg, Milford Junction, New Paris and Goshen, Ind.

25909. To establish on (a) **stone, crushed**, in bulk, in open top cars, and **stone screenings**, in bulk, in open top cars, in straight or mixed carloads, from Kenneth, Ind.; (b) **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) **and gravel**, carloads, from Kenneth and Lake Ciecott, Ind., rate of 85c to Stockport and 90c per net ton to Anthony and Muncie, Ind. Route—P. R. R. direct. Present—To Stockport, $1, and to Anthony and Muncie, $1.01 per net ton.

25915. To establish on **sand** (except blast, core, engine, filter, fire or furnace foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, from Tecumseh, Mich., to Portage, Mermill, Trombley and Cygnet, O., rate of $1 net ton. Present, $1.13 net ton.

25916. To establish on **agricultural limestone, unburned**, in open top cars only; **stone, crushed**, in open cars, in bulk only, and **stone screenings** in open cars, in bulk only, in straight or mixed carloads, Marble Cliff, O., to Chester, W. Va., rate of $1.45 net ton. Route—Via P. R. R. direct. Present—Classification basis.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

25918. To establish on **lime, agricultural**, having no commercial value for chemical or building purposes, minimum weight 30,000 lb., from Gibsonburg and Woodville, O.:

To Ohio points—

(Penna. R. R.)	Present	Proposed
New Waterford	16	11
East Palestine	16	11
Shadyside	16½	12½
Wegee	16½	12½
Powhatan	16½	12½
Weavers	14	11
New Madison	14	11
New Paris	15	11

25919. To establish on **lime, agricultural**, having no commercial value for chemical or building purposes, minimum weight 30,000 lb., from Gibsonburg and Woodville, O.

To Ohio points—

(N. Y. C.-O. C. L.)		Present	Proposed
McMoran		12	10
Lewiston		12	10
Russel's Point		12	10
Lake View		12	10
Santa Fe		12	10
Gutman		12	10
Slater		12	10
Wapakoneta		11½	10½
Moulton		12	10½
St. Mary's		12	10½
(N. Y. C. R. R.)	(a)	(b)	
Melbern, Ohio	12	12½	11
Edgerton, Ohio	12	12½	11
Mina, Ohio	12	12½	11

(a) From Woodville. (b) From Gibsonburg.

25920. To establish on **lime, agricultural**, having no commercial value for chemical or building purposes, minimum weight 30,000 lb., from Gibsonburg and Woodville, Ohio.

To—

(A. C. & Y. Ry.)	Pres.	Prop.
Forest Hill, Ohio	13½	8
Colona, Ohio	13½	8
Mogadore, Ohio	13½	8

25921. To establish on **lime, agricultural**, having no commercial value for chemical or building purposes, minimum weight 30,000 lb., from Gibsonburg and Woodville, Ohio, to—

(W. & L. E. R. R.)	Pres.	Prop.
Glen Run, Ohio	16½	12½
Connor, Ohio	16½	12½
Warrenton, Ohio	16½	12½
Ross, Ohio	15	12½

25930. To establish on **sand and gravel**, carloads, Fairview and Swanville, Penn., to Oil City, Penn., rate of $1.20 net ton. Present, $1 net ton.

25934. To cancel rate of $4.63 net ton on **sand, blasting, engine, fire, foundry, glass, molding or silica**, carloads, from Millington, Oregon, Ottawa, Sheridan, Utica and Wedron, Ill., to East Rochester, N. Y., permitting to apply in lieu thereof rate of $4.91 net ton as published in Item 11180 of C. F. L. Tariff 218G.

25938. To cancel rates on **sand**, other than blast, engine, foundry, glass or molding; also **gravel**, carloads, from Barberton, Botzum, Crystal Springs, Everett, Massillon and Warwick, O., to points in Illinois, Indiana and Michigan, as shown in Exhibit "A" attached, published in B. & O. R. R. Tariff I. C. C. 21643, permitting to apply in lieu thereof Official Classification basis.

EXHIBIT "A"

(Rates in cents per 2000 lb.)

To (representative points)	
Ann Arbor R. R.	
(164) Mt. Pleasant, Mich., to (227) Cadillac, Mich., inclusive	391
(268) Copemish, Mich., to (292) Frankfort, Mich., inclusive	414
Chicago and Alton R. R.	
(590) Auburn, Ill., to (665) Hagaman, Ill., inclusive	345
(725) Brighton, Ill., to (750) Wann, Ill., inclusive	345
(835) Mason City, Ill., to (850) Petersburg, Ill., inclusive	345
Chicago and Eastern Illinois R. R.	
(10355) Evansville, Ind., to (10495) Princeton, Ind., inclusive	345
Chicago and Illinois Midland Ry.	
(170) Petersburg, Ill., to (220) Shops, Ill., inclusive	345
Chicago and Northwestern Ry.	
(265) Belvidere, Ill., to (295) Freeport, Ill., inclusive	345
(665) Barrington, Ill.	322
Chicago, Burlington and Quincy R. R.	
(165) Earlville, Ill., to (210) Buda, Ill., inclusive	322
(690) Kings, Ill., to (700) Davis Junction, Ill., inclusive	322
(2090) East Alton, Ill.	345
(2145) Waverly, Ill., to (2165) Girard, Ill., inclusive	345
C. M. St. P. & P. R. R.	
(745) Holcomb, Ill., to (845) Granville, Ill., inclusive	322
C. R. I. & P. Ry.	
(195) Wyanet, Ill.	322
Grand Trunk Ry.	
(880) Mt. Clemens, Mich.	288
Illinois Central R. R.	
(2565) Brows, Ill., to (2650) New Albany, Ind., inclusive	345
(5260) Henderson, Ky.	385
Louisville and Nashville R. R.	
(13742) Henderson, Ky.	385
(14065) Evansville, Ind.	345
Michigan Central R. R.	
(1160) Rochester, Mich., to (1200) Lapeer, Mich., inclusive	288
(1575) Midland, Mich.	391
(2545) St. Clair, Mich.	288
New York Central R. R.	
(8320) Zearing, Ill.	322
Pennsylvania R. R.	
(27200) Howard City, Mich., to (27245) Reed City, Mich., inclusive	414
(27350) Lake City, Mich., to (27845) Mackinaw City, Mich., inclusive	472
Pere Marquette Ry.	
(525) White Cloud, Mich., to (645) Thompsonville, Mich., inclusive	414
(3300) Pigeon, Mich.	368
Port Huron and Detroit R. R.	
(10) Marysville, Mich., to (20) Marine City, Mich., inclusive	368
Southern Ry.	
(11345) Oakland City, Ind., to (11420) Browns, Ill., inclusive	345
(11815) Evansville, Ind.	345
Wabash Ry.	
(1315) Curran, Ill.	345

25939. To establish on **sand, molding**, carloads (See Note 3), from Rockport, Ind., to East St. Louis, Ill., rate of 161c per ton of 2000 lb., appli-

cable only on traffic destined to Lemars and Sioux City, Ia. Route—Via E. & O. V. Ry. to Evansville, Ind., L. & N. R. R. beyond. Divisions—The E. & O. V. Ry. to be allowed to retain 45c per net ton to Evansville, Ind. Present rate, 206c per ton of 2000 lb. (Evansville combination), per E. & O. V. Ry. Tariff 5A, I. C. C. 31, and C. F. A. L. Tariff 237-I, I. C. C. 2216.

25940. To establish on **crushed stone**, carloads (See Note 3), from Lima, O., to Defiance, O., rate of 90c per ton of 2000 lb. Present rate, 70c per ton of 2000 lb., as per D. T. & I. R. R. Tariff 1186F, Ohio 512.

25943 (cancels W. D. A. 25774). To establish on **sand and gravel**, carloads (See Note 3), from Wapakoneta, O., to points in Ohio, rates as shown below (tariff authority, Agent Jones, 230A). Proposed rate, per net ton; present, per 100 lb.

To	Prop.	Pres.
Alger, O.	70	10½
McGuffey, O.	70	11½
Kenton, O.	80	11½

25969. To establish on **crushed stone**, coated with tar, oil or asphaltum, carloads, from Pittsburgh, Penn., to points in Pennsylvania and Ohio, rates as shown in exhibit "A" attached. Present rates, sixth class.

EXHIBIT "A"

Proposed rates on crushed stone, coated with oil, tar or asphaltum, from Pittsburgh, Penn., to representative points in Pennsylvania Ohio and West Virginia

To	Rate	To	Rate
Wilmerding*	96	Wheeling†	130
McKeesport*	96	Youngstown‡	130
Freedom*	96	Benwood†	130
Jeannette*	107	Salem‡	130
Burgettstown*	107	Sharpsville*	130
Natrona*	107	Cadiz‡	130
Beaver Falls*	107	Johnstown*	142
Washington*	107	Warren‡	142
Monongahela*	107	Alliance‡	142
Donora*	107	Stoneboro*	142
Vandergrift*	107	Martins Ferry‡	142
Collier†	107	Uhrichsville‡	142
Crabtree*	107	Canton‡	153
Latrobe*	119	Newcomerstown‡	153
Wampum*	119	Massillon‡	153
Steubenville‡	119	Dover*	153
Kittanning*	119	Altoona*	153
Scottdale*	119	Coshocton‡	153
Wellsburg†	119	Ashtabula‡	153
New Castle*	119	Akron‡	176
Butler*	119	DuBois*	176
Connellsville*	119	Oil City*	176
Blairsville*	119	Cleveland‡	176
Lowellville‡	119	Erie*	176
Chester†	130	Marietta‡	199

* Points in Pennsylvania.
† Points in West Virginia.
‡ Points in Ohio.

25970. To establish on **sand and gravel**, carloads, from Milford, Ind.

To Indiana points—

	Pres.	Prop.		Pres.	Prop.
Rochester	140	90	Huntington	107	90
Athens	140	90	Markle	(4)	90
Akron	127	85	Uniondale	(4)	95
Disko	127	85	Kingsland	(4)	95
Laketon	127	80	Tocsin	(4)	100
Newton	127	80	Magley	(4)	100
Bolivar	*	*	Preble	(4)	100
Servia	107	80	Decatur	(4)	105
Bippus	107	85			

*Junction. (4) Sixth class.

25980. To establish on **cement, viz.: Hydraulic, natural or portland**, in straight or mixed carloads, minimum weight 50,000 lb. per car, marked capacity of car to govern if less, Speeds, Ind., to Grace Siding and Stoners Siding, Ind., rate of 13½c. Route—P. R. R., Conlog, Ind., Indiana Service Corp. Present—Combination basis.

25983. To establish on **stone, crushed**, in bulk, in open top cars, **and stone screenings**, in bulk, in open top cars, in straight or mixed carloads, from Kenneth, Ind.

To Indiana points (crushed stone):

(N. Y. C. & St. L. R. R.)	Pres.	Prop.	(N. Y. C. & St. L. R. R.)	Pres.	Prop.
Scircleville	112	95	Tiosa	100	95
Hillisburg	112	95	Macy	100	95
Boyleston	101	95	Deeds	100	95
Forest	104	101	Doyle	100	92
Michigantown	104	101	Peru	92	80
Avery	104	101	S. Wanatah	127	101
Jefferson	115	90*	Thomaston	127	101
Fickle	115	90*	Hayville	127	101
Clarks Hill	115	90*	Brems	127	101

*Route via Frankfort, Ind.

TRUNK LINE ASSOCIATION DOCKET

24429. **Sand** (other than blast, engine, foundry, glass, molding or silica) **and gravel**, carloads (See Note 2), from Baltimore, Md., to Bladensburg, Md., 80c per net ton. (Present rate, $1.25 per net ton.) Reason—Proposed rate is comparable with rates from Georgetown, D. C.

24436. **Slag, crude or crushed**, in bulk, carloads (See Note 2), from Birdsboro, Penn., to Lytle, Penn., 90c per net ton. (Present rate, $1.15 per net ton.) Reason—Proposed rate is comparable with rates from Pottstown, Penn., to Pottsville, St. Clair and Minersville, Penn., and from Birdsboro, Penn., to Minersville, Penn.

24438. **Slag, crude or crushed**, in bulk, carloads (See Note 2), from Coatesville, Penn., to York, Penn., $1.05 per net ton. (Present rate, $1.25 per net ton.) Reason—Proposed rate is comparable with rates to Harrisburg and Middletown, Penn.

24440. **Slag**, in bulk, carloads (See Note 2), from Swedeland, Penn., to Bethlehem, Penn., 95c per net ton. (Present rate, $1.50 per net ton.) Reason—Proposed rate is fairly comparable with rates on like commodities for like distances, services and conditions.

24446. **Crushed stone**, carloads (See Note 2), from Fort Deposit, Md., to Stony Run, Md., 90c, Odenton, Patuxent, Md., $1.05, and to Lanham, Md., $1.15 per net ton. Reason—Proposed rates are comparable with rates to Catonsville, Barclay and Chestertown, Md.

24454. **Sand** (other than blast, engine, foundry, glass, molding, quartz, silica or silex), **carloads** (See Note 2), from Sherburne Four Corners, N. Y., to Ulster and Delaware R. R. stations. Rates ranging from $1.75 to $2.20 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

24455. **Lime, common, hydrated, quick or slacked**, carloads, minimum weight 30,000 lb., from Staunton, Va., to Gettysburg, Penn., Riderwood, Silver Springs, Cambridge, Salisbury, Chestertown, Md., Seaford, Wilmington, Dover, Del., and various points in the same territory. Rates ranging from $2.60 to $4.50 per net ton. Reason—Proposed rates are fairly comparable with rates from Strasburg Junction, Va.

24324. **Sand and gravel**, other than blast, engine, foundry, glass, molding or silica, carloads (See Note 2), from Machias, N. Y., to Penfield, Penn., $1.40 per net ton.

24371. **Sand**, carloads, (a) shipped in open-top cars, (b) shipped in boxed cars or closed equipment (See Note 2), from Pinewald and Quail Run, N. J., to Clarksburg and Lumberport, W. Va., (a) $3.10, and (b) $3.40 per net ton.

24465. **Gravel and sand** (other than blast, core, engine, fire, foundry, glass, molding, quartz, silex or silica), carloads (See Note 2), from **Machias**, N. Y., to Red House, N. Y., 80c per net ton. (Present rate 91c per net ton.) Reason—Proposed rate is comparable with rates on like commodities from and to points in the same general territory.

24467. Establish switching rate of $12.50 per car on **crushed stone**, from C. H. Ziegenfuss and Co. plant to 12th St. Yard, Union St. Yard, L. V. R. R. team track deliveries at Allentown, Penn. Rate to expire on completion of contracts. Reason—Switching charge is comparable with switching charges now in effect on like commodities at Bethlehem, Penn.

24469. **Sand and gravel** (other than blast, engine, foundry, glass, molding or silica), carloads (see Note 2), from Lancaster, N. Y., to East Buffalo to Black Rock, N. Y., inclusive, 40c; to North Tonawanda, N. Y., 65c, and to Niagara Falls and Suspension Bridge, N. Y., 75c per net ton. Connecting lines' switching charges will not be absorbed under these rates. Reason—Proposed rates comparable with rates from Clarence, N. Y.

24476. **Crushed stone**, carloads (See Note 2), from Bethlehem, Penn., to C. N. J. points, Bayway, Westfield, Plainfield, Higginsville, Lebanon, Cary's, Dover, Hibernia, Weldon, Glen Gardner, Vulcanite and various. Rates ranging from 70c to $1.15 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

24479. **Sand and gravel**, carloads (See Note 2), from Flanders, N. J., to Montreal, Que., 24c per 100 lb. (Present rate 34½c per 100 lb., sixth class.) Reason—Proposed rate is comparable with rate from Jersey City, N. J., Manville, N. J., etc., to Montreal.

M-1491. **Ground, granulated and pulverized limestone and limestone dust, including glass house and agricultural limestone**, carloads, minimum weight 60,000 lb., from Lime Crest and Ogdensburg, N. J., to stations on the C. R. R. of N. J., L. V. R. R., D. L. & W. R. R., D. & H. Co., N. Y. O. & W. Ry., rates ranging from $1.70 to $2.10 per net ton; also to Chestnut Ridge Railway Palmerton stations at same rates as applicable to Palmerton via competing lines, with rates to arbitrary points 1c in excess of Palmerton rate and rates to competing points on L. & N. E. R. R. same as applicable via competing lines.

1493. **Cement**, carloads, from Lehigh district, Penn., to Dark Harbor, Castine, Me., 33½c, and Sorrento, Hancock Point and Bar Harbor, Me., 35½c per 100 lb.

1497. To establish rates on **cement**, carloads, from all trunk line producing points, including New Castle district, to all destinations on the Monongahela railway on same basis of rates as applies to Randall, except to stations on **Scotts Run** branch, which will be on basis of 3c higher than the Randall rate.

1499 (cancels rate proposal 23398—shipper). **Limestone, ground or pulverized, and limestone dust**, carloads, minimum weight 50,000 lb., from Jamesville, N. Y., to stations on the D. L. & W. R. R. in the state of Pennsylvania, Portland, Mt. Pocono, Lehigh, Scranton, Alford, Hallstead, Penn., and various, rates ranging from $1.40 to $1.80 per net ton.

1504. To establish rates on **cement**, carloads, from all producing points in Trunk Line territory, including New Castle, Penn., district, to stations on the Prattsburgh Ry. on basis of 1c per 100 lb. over the rate to Kanona, N. Y.

24482. **Sand and gravel** (other than blast, engine, foundry, glass, molding or silica) **and crushed stone** (See Note 2), from Alfred, N. Y., to Canisteo, N. Y., 60c per net ton. Present rate, 75c per net ton. Reason—Proposed rate is comparable with rates on like commodity for like distances, services and conditions.

24485. **Sand and gravel**, carloads (See Note 2), from Malone, N. Y., to Mooers Forks and Mooers, N. Y., 65c per net ton, rate to expire on December 31, 1930. Reason—To meet motor truck competition.

24486. **Crushed stone**, carloads (See Note 2), to Middleport, Penn., from Steelton, Penn., $1.15; Reading, Penn., 90c, and Birdsboro and Trap Rock, Penn., 95c per net ton. Reason—Proposed rate is comparable to rates on like commodities from and to points in the same general territory.

24492. **Glass sand**, carloads (See Note 2), from Tatesville, Penn., to points in Agent Curlett's I. C. C. A265, taking Rate Bases 60A to 60G, 76D to 78D to 120, inclusive, proposed rate as per Specific Group 276, shown in Agent Curlett's A265. Reason—Proposed rates are comparable with rates from Mapleton, Penn.

24495. **Lime, common, hydrated, quick or slacked**, except agricultural and fluxing lime having no commercial value for chemical or building purposes, carloads, minimum weight 30,000 lb., from Brills, Newark, Kearny, Port Newark, N. J., to South Charleston, W. Va., 24½c per 100 lb. (Present rate, 39c per 100 lb.) (Sixth class.) Reason—Proposed rate is comparable with rate from Philadelphia and Chester, Penn.

24501. **Slag**, in bulk, carloads (See Note 2), from Birdsboro, Penn., to Shamokin, Penn., $1.25 per net ton. (Present rate, $1.40 per net ton.) Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

24502. **Crushed stone**, carloads (See Note 2), from Martinsburg, W. Va., to Great Cacapon, W. Va., 80c, and Paw Paw, W. Va., 90c per net ton, rates to expire April 1, 1931. Reason—The proposed rates are comparable with rates from Engle, W. Va., Frederick, Md., to Hancock, W. Va.

24039. **Lime, agricultural, building, chemical and land**, carloads, minimum weight 40,000 lb., except building lime, 30,000 lb., from Grove, Frederick, Security, Martinsburg, Charlestown, Winchester, Cedar Creek and Strasburg district to Wykagl, N. Y., 22c per 100 lb.

24371. **Sand**, carloads, (A) shipped in open top cars; (B) shipped in box cars or closed equipment, (See Note 2), from Reading Co. points in South Jersey covered by Groups 4 and 5, as per Reading Co. I. C. C. 864, to Lumberport, W. Va., (A) $3.10 and (B) $3.40 per net ton.

24396. (A) **Lime**, carloads, minimum weight 30,000 lb., and (B) **limestone, ground, unburned**, carloads, minimum weight 50,000 lb., from Grove, Frederick, Security, Martinsburg, Charlestown, Winchester, Cedar Creek, Strasburg district of the B. & O. R. R. to L. I. R. R. station points. Group B (a) 19½c, (b) 18½c per 100 lb., Group C (a) 20½c, (b) 19½c per 100 lb.

24525. **Plaster board**, carloads (for mixed carloads with lime and plaster, as follows: A, **lime**, carloads, minimum weight 40,000 lb.; B, mixed carloads of lime, plaster and articles **taking same** rates, and plaster board, will be charged **at actual** weight and at the applicable carload rate for each of the respective commodities **in straight carloads**, subject to minimum weight of 40,000 lb. for each mixed carload, deficit in the minimum weight, if any, to be paid for at the rate on plaster, carloads, from Batavia, Clarence Centre, Transit, Akron, Oakfield and Wheatville, N. Y., to Lancaster, N. Y., (A) 11½c, (B) 10c per 100 lb. (Present, rate, combination.) Reason—The proposed rate is comparable with rate from Garbutt, N. Y.

24526. **Crushed stone**, carloads (See Note 2), to D. L. & W. R. R. stations, Cresco, Mount Pocono, Lehigh, Moscow, Glenburn, Clark's Summit, Kingsley, etc., from Bethlehem, Penn., rates ranging from $1.20 to $1.50, and from White Haven rates ranging from $1.10 to $1.30 per net ton. Reason—Proposed rates are fairly comparable with rates from Nazareth, Penn.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

20475. **Gypsum or gypsum products:**

Blocks, gypsum or plaster	Group A
Gypsum, ground	Group A

Lime, common, hydrated, quick or slaked,

when shipped in mixed carloads with
other commodities specified in this item..Group A
Plaster, calcined (plaster of paris), fire-
proofing, land, stucco or wall)..................Group A
Plaster board ....Group B

To Albany, N. Y., from Boston, Mass.: Present—Group A, 22c; Group B, 22c. Proposed—Group A, 14c; Group B, 16c.

To Albany, N. Y., from Portsmouth, N. H.: Present, Group A, 17½c; Group B, 19½c. Proposed—Group A, 14c; Group B, 16c.

Reason—To establish rates comparable with those now in effect from other producing points.

818-38. To cancel commodity rates on **common sand**, carloads, from New England origin points to C. F. A. destinations as named in Item 1990 of N. E. F. A.-Agency Tariff 1A, Agent Van Ummersen's I. C. C. 100. Reason—To cancel obsolete rates, value will not permit movement of common sand for distances that are involved.

20613. To cancel commodity rates on **crushed stone**, from Brainard, N. Y., to various B. & A., N. Y. C., N. Y. N. H. & H., D. & H. and B. & M. R. R. stations as named in Rutland R. R. I. C. C. No. 5602 and apply in lieu thereof sixth class rates. Reason—To cancel obsolete rates.

SOUTHERN FREIGHT ASSOCIATION DOCKET

51618. **Sand, glass**, from Hagerstown, Md. (applicable on traffic originating beyond), to Erwin and Kingsport, Tenn. It is proposed to establish in lieu of lowest combination, through commodity rate of 230c per net ton on sand, glass, carloads (See Note 3), from Hagerstown, Md., to Erwin and Kingsport, Tenn.

51650. **Lime (calcium), crude phosphate of**, from Anniston, Ala., to St. Louis, Mo., and group. Present rate, 50c (eighth class). Proposed rate on lime (calcium), crude phosphate of, in bulk in page 10 of Agent Glenn's I. C. C. A684, from Anniston, Ala., to Belleville, East St. Louis, Ill., and St. Louis, Mo., 42c per 100 lb.

51675. **Lime**, from Ladds, Ga., to Green Mountain, N. C. It is proposed to publish a rate of 340c per net ton on lime, carloads, as described on page 10 of Agent Glenn's I. C. C. A684, from Ladds, Ga., to Green Mountain, N. C., in lieu of the present rate of 240c per net ton. The present rate of 240c, as published on page 72 of tariff mentioned above, is the result of a typographical error.

51716. **Phosphate rock, crude lump, or phosphate rock, crude ground**, from Mt. Pleasant-Centreville district to Wabash Ry. stations. In lieu of combination rates, it is proposed to establish rate of 603c per net ton on phosphate rock, crude lump, or phosphate rock, crude ground, in bulk or in bags, carloads, minimum weight 30 tons of 2000 lb., from Mt. Pleasant-Centreville district, as shown in L. & N. R. R., I. C. C. A-15803, to Wabash Ry. stations, Bridgeburg through Windsor, Ont., and Niagara Falls through Welland, Ont. Made in line with rates that have been established to Bridgeburg, Windsor, Niagara Falls and Welland via the Michigan Central R. R.

51717. **Phosphate rock**, from Mt. Pleasant-Centreville district to Litchfield and Madison Ry. stations. In lieu of combination rates, it is proposed to establish the following through rates on phosphate rock, crude lump or crude ground, carloads, as described in and subject to minimum weight prescribed in L. & N. R. R., I. C. C. A-15803, from the origins mentioned, as shown in L. & N. R. R., I. C. C. A-15803: To stations, Barco, Ill., through Worden, Ill., 404c; to stations, Staunton, Ill., and Mt. Olive, Ill., 426c per net ton. The proposed rates are in line with rates to junction points, applicable via other delivering lines.

51718. **Gravel**, from Charlotte, N. C., to Baltimore (Curtis Bay), Md. In lieu of combination rate it is proposed to establish through rate of 380c per net ton on gravel, carloads (See Note 3), from and to points mentioned, based on I. C. C. Docket 17517 scale to Richmond, plus specific proportion of 11c per 100 lb.

51731. **Crushed stone**, from Quarry, Va., to Pikeville, Ky. Lowest combination now applies. Proposed rate on crushed stone, carloads (See Note 3), from Quarry, Va., to Pikeville, Ky., 130c per net ton.

SOUTHWESTERN FREIGHT BUREAU DOCKET

20873. **Lime, Keene's cement and/or wall plaster**, etc., from Medicine Lodge, Kan., to interstate points. To include common lime in commodity descriptions now provided in tariffs applying from Medicine Lodge, Kan., to interstate points, shown in A. T. & S. F. Ry. Tariffs Nos. 6677-O, 6681-E, 11039-G, and 13660-A, so as to provide mixed carload rating as follows: "Lime may be shipped in mixed carloads with Keene's cement and/or wall plaster and articles taking wall plaster rates, provided that the weight of the lime does not exceed 25% of the weight of the entire shipment. Actual weight to apply on the lime contained in the car, at rate of 3c per 100 lb. higher than the rate applicable on plaster. On the balance of the carload the current carload rates to apply on the actual weight. Entire carload to be subject to the minimum weight applicable on plaster, and if the actual weight of the entire carload is less than such minimum weight, the deficit will be charged for at the plaster carload rate." This matter has again been handled with the shippers and they stated that they are agreeable to having the same mixed carload rule as is applicable in connection with shipments from Blue Rapids and Irving, Kan., as provided for in Item 12-B, Supplemental 10, Union Pacific Tariff 3079-C, I. C. C. 3309.

20888. **Sand, chatt and crushed rock**, from Memphis, Tenn., to points in Arkansas, Louisiana and Missouri. To amend Item 1600 of S. W. L. Tariff 114D, applying on sand, chatt, crushed rock, etc., carloads, from Memphis, Tenn., on traffic originating points in the Southeast to points in Arkansas, Louisiana and Missouri, by eliminating paragraph "C" of the exception. The rates from Memphis to the destinations involved apply on shipments originating at other producing points in the Southeast, and it is felt there is no reason why the rates should not apply from Cherokee and Margerum, Ala.

20899. **Sand, gravel**, from Bloomfield, Mo., to Memphis, Tenn. To establish a rate of $1.13 per ton of 2000 lb. on sand and gravel, straight or mixed carloads, minimum weight 80,000 lb. (or if marked capacity of car is less than 80,000 lb., marked capacity will govern), from Bloomfield, Mo., to Memphis, Tenn. The purpose of the above is to put the Bloomfield, Mo., shipper of sand and gravel on a competitive basis with the shipper of crushed rock from Anna, Ill., from which point the rate to Memphis is 113c as per I. C. C. Tariff 148M.

WESTERN TRUNK LINE DOCKET

2898-H. **Sand and gravel**, carloads (See Note 1), from Forreston, Ill., to I. C. R. R. stations in Iowa. Rates to representative points.

	Miles	Pres. Rate	Prop. Rate
Dyersville, Iowa	111	140	115
Manchester, Iowa	128	150	120
Waterloo, Iowa	175	160	145
Cedar Rapids, Iowa	171	160	145
Cedar Falls, Iowa	181	170	145
Iowa Falls, Iowa	224	180	155

Complete copy of the exhibit will be furnished on request.

Sup. 1 to 7341. **Cement, hydraulic, portland or natural**, carloads, as described in Item No. 10 of W. T. L. Tariff 133G, Agent E. B. Boyd's I. C. C. A2033, from Mankato and Carney, Minn., to points in Nebraska. Rates:

Index No.		Pres.	Prop.
1740	Peru to		
1749	Auburn	18½	17
1763	Shubert to		
1764	Verdon	19	17
1776	Rulo to		
1778	Falls City	20	17
1779	Salem	19½	17

4264-D. **Stone, crushed**, carloads (See Note 3), less than 40 000 lb. will apply, from Dell Rapids and Sioux Falls, S. D., to representative points, rates in cents per ton:

From Dell Rapids, S. D.

To	Pres.	Prop.
Pipestone, Minn.	110	70
Ortonville, Minn.	200	180
Granite Falls, Minn.	310	200
Olivia, Minn.	310	210

From Sioux Falls, S. D.

To	Pres.	Prop.
Pipestone, Minn.	140	70
Ortonville, Minn.	200	180
Granite Falls, Minn.	310	200
Olivia, Minn.	310	210

Complete copy of the exhibit will be furnished on request.

ILLINOIS FREIGHT ASSOCIATION DOCKET

I.R.C. 5805. **Lime**, carloads, from Mosher and Ste. Genevieve, Mo., to Waterworks, Ill. Present rate, 14c, 30,000 lb.; proposed, 14c 30,000 lb., 11½c 70,000 lb.

3630F. **Sand and gravel** (except blast, engine, foundry, glass or molding), carloads (See Note 3), from Golconda, Ill. Rates in cents per net ton.

To (representative points)—	Present	Proposed
Eldorado	Class	90
Vienna	Class	95
Karnak	Class	95
Mound City	Class	95
Cairo	Class	100

3985. **Sand and gravel**, carloads (See Note 1), except when car is loaded to full cubical or visible capacity actual weight will apply, from Allison Branch, Ill., to Kincaid, Ill. Present rate, class; proposed, 128c per net ton.

Illinois Producers Win New Sand and Gravel Rates to Iowa

NEW RATES on sand and gravel from Chillicothe, Moline, Ottawa, Sheridan and Yorkville, Ill., to points in Iowa on the Burlington, Rock Island and Wabash systems have been prescribed by the Interstate Commerce Commission, ending a fight of several months led by the McGrath Sand and Gravel Co. of Chillicothe and the Moline Consumers Co., to obtain rates to enable them to compete with Iowa producers on equal terms.

The commission found that existing eastbound rates give the Iowa sand and gravel companies a fair chance to compete in Illinois and decided that the Illinois shippers were entitled to the same chance to compete in Iowa.

From Chillicothe to Iowa destinations now taking a rate of $2.20 per ton, the reductions will result in single line rates ranging from $1.15 to $1.30, and joint line rates from $1.30 to $1.45; to points taking a rate of $2.30 now, in single line rates of $1.45 and $1.55 and joint line rates of $1.55 and $1.65.

From Ottawa the reductions will be from $1.70, $1.80, $1.90 and $2 per ton to a range from $1.50 to $1.75; from Moline the Iowa rates will be cut from a range of $1.40 to $1.80 to one between $1.15 and $1.55 for single line hauls and $1.30 and $1.65 for joint line hauls.

I. C. C. Proposed Reports

22577. Cement Reparation. Examiner P. F. Mackey in No. 22577, Dewey Portland Cement Co. et al. vs. Arkansas & Louisiana, Missouri, et al., deals with the question of reparation on cement that moved in the statutory period prior to the commission's decision in Iola Cement Mills Traffic Association vs. A. and V., 144 I. C. C. 585, called the Iola case. In that case the commission prescribed rates in accordance with a distance scale. Reparation was not sought in the Iola case. The examiner said rates satisfactory to shippers and receivers herein were established on March 10, 1929, pursuant to the orders entered in that proceeding. Reparation only was sought in this title case and those joined with it. The latter are two sub-numbers of the title complaint, Lehigh Portland Cement Co. (Kansas) vs. Arkansas & Louisiana Missouri et al., and Lehigh Portland Cement Co. (of Alabama) vs. A. G. S. et al.; No. 22508, Arkansas General Construction Co. vs. Ashley, Drew and Northern et al.; No. 22675, Darragh Co. et al. vs. Santa Fe et al.; No. 22676, G. A. Lelper and Co. et al. vs. Rock Island; No. 22541, M. D. L. Cook vs. Missouri Pacific et al., and No. 22418, Parlor City Lumber Co., Inc., vs. Missouri Pacific.

The complaint alleged that the rates prior to March 10, 1929, from certain points in the Kansas gas belt, Bonner Springs and

Sunflower, Kan., Ada, Okla., Alphia, Marquette, Prospect Hill, St. Louis, Sugar Creek and Hannibal, Mo., Eagle Ford and Harrys, Tex., Phoenixville, North Birmingham and Ragland, Ala., Richard City, Cowan and Nashville, Tenn., to points in Arkansas and Louisiana were unreasonable.

Examiner Mackey recommended a finding of unreasonableness and an award of reparation. In an appendix, not herein reproduced, he set forth the commencement dates of the statutory periods within which the shipments on which reparation is to be made moved.

22771. Revision of Rates on Ground Limestone. Examiner C. W. Griffin in No. 22771, Falling Spring Lime Co., Inc., vs. C. and O. et al., and a sub-number, Same vs. Pennsylvania et al., proposes a revision of the rates on ground limestone from Barber, Va., to points in southern and official territory, based on a finding of unreasonableness for the future. The scale recommended begins with a rate of 65 cents a net ton for a single line haul of 20 miles and 75 cents for a joint line haul. The scale progresses in 10-mile blocks by adding 10 cents for each block in the single line scale until it reaches 125 cents for 90 miles. The scale for joint line hauls progresses by the addition of 10 cents for each 10-mile block up to 125 cents for a 70-mile haul. Then the progression in the joint line scale is 5 cents for each of the two blocks up to 90 miles, the joint line rate for that distance being 130 cents. For hauls of 100 miles and greater the scale is the same for both single and joint line hauls. It begins at that distance with a rate of 130 cents, becomes 160 cents for 200 miles, 185 cents for 300 miles, 210 cents for 400 miles, 235 cents for 500 miles, 260 cents for 600 miles, 285 cents for 700 miles, 310 cents for 800 miles and ends with a rate of 320 cents for 840 miles.

The examiner said that in computing distances for the application of the scales proposed by him the shortest routes over which carload traffic could be moved without transfer of lading should be used.

22691. Cement Rates. Examiner Wm. A. Disque in No. 22691, Dewey Portland Cement Co. et al. vs. Santa Fe et al., and a sub-number, Same vs. Cedar Rapids and Iowa City et al.; No. 22780, Lehigh Portland Cement Co. et al. vs. Same, and No 22184, State Cement Commission (of South Dakota) vs. Santa Fe et al., proposes dismissal, contending that the rates on cement from Iowa producing points to destinations in Iowa, Missouri, Minnesota, Nebraska and South Dakota are not unreasonable or unduly prejudicial in comparison with those from Louisville, Neb., or Rapid City, S. D., and that the intrastate rates on cement from Louisville and Rapid City are not unjustly discriminatory against interstate commerce or unduly preferential in comparison with rates from Iowa producing points. Also, that the rates on cement from Rapid City to St. Paul and Minneapolis, Minn., and intermediate points are not unreasonable or unduly prejudicial in comparison with those from Kansas and Oklahoma producing points.

22649. Sand Rates. Examiner Paul G. Thompson in No. 22649, Atlantic Paving Co. vs. R. F. and P. et al., reports the rates on sand from Massaponax and Puddledock, Va., to Paschall, N. C., inapplicable, and that the rates—$1.66 a net ton from Massaponax and $1.46 from Puddledock—are unreasonable to the extent they exceeded or may exceed $1.35 and $1.05 respectively. Reparation is proposed. The report also embraces No. 22825, Same vs. N. and W. et al.

23092. Revision of rates on cement. Examiner Myron Witters in No. 23092, Monolith Portland Cement Co. vs. Santa Fe et al., found the rate on cement from Monolith, Calif., to Las Vegas, Nev., unreasonable and unduly prejudicial to the extent that it exceeds or may exceed 30.5 cents. The rates from Monolith to other points in Nevada and Utah were found unduly prejudicial to the extent they exceed the rates contemporaneously in effect from Los Angeles, Colton and Crestmore, Calif. Order requiring removal of undue prejudice was proposed by Examiner Witters.

Ohio Fluxing Stone Rates

THE Interstate Commerce Commission in No. 23625, covering rates on raw dolomite and fluxing stone within the state of Ohio, upon petition of the railroads affected by the rates in question, has instituted an investigation under the thirteenth section to determine whether the rates on raw dolomite and fluxing stone required by the Public Utilities Commission of Ohio to be maintained by them, cause or will cause any undue or unreasonable advantage, preference or prejudice as between persons or localities in intrastate commerce, on the one hand, and interstate or foreign commerce on the other hand, or any undue, unreasonable or unjust discrimination against interstate or foreign commerce.

The investigation is also to enable the commission to say what rates, if any, or what maximum or minimum, or maximum and minimum rates shall be prescribed, in order to remove such advantage, preference, prejudice or discrimination, if any, as may be found to exist.

All railroads operating in Ohio, subject to the commission's jurisdiction, are made respondents to this proceeding. Ohio authorities also have been notified of the institution of the inquiry. The proceeding has been assigned for hearing before Examiner Diamondson at the federal court rooms, Columbus, Ohio, on October 2. Petitions were filed by the railroads alleging unjust discrimination against interstate commerce last April. The question is as to the relationship of rates from points in Ohio to the Youngstown, Ohio, steel district in comparison with rates from points in Western Pennsylvania to the same destinations.

Kelley Island Company to Open New Quarry

THE NEW LIMESTONE QUARRY of the Kelley Island Lime and Transport Co. is expected to be in operation on Kelley's Island in Lake Erie by September 1.

Preliminary construction work is under way now. A new bridge connecting the old and new quarries is now being built at a cost of $5000. It will be of steel and concrete, 40 ft. long and 28 ft. wide, and will be large enough to allow steam shovels and locomotives to pass beneath and for cars to run across the top. A sidewalk will be built on each side of the bridge for the use of pedestrians.

The large stripping shovel belonging to the company was moved to the new quarry recently. The quarry is expected to produce millions of tons of flux limestone and the company expects to work it for at least 25 or 50 years.—*Sandusky* (Ohio) *Register.*

Universal Atlas Cement Tries New Publicity Stunt

SAILING into the blue, bearing a cheerful safety message, 955 gaily colored balloons, one for each consecutive no-accident day, were used by the Duluth plant of the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp., at its safety celebration on August 20. At that time the safety trophy won by this plant for going through the calendar year of 1929 with no accidents was unveiled. Mayor S. F. Snively and R. J. Fisher, president of the Advisory Public Safety committee, both of Duluth, were special speakers.

The safety trophy, which this plant has now won three times, was presented by George A. Ricker, representing the Portland Cement Association, and Fred Robinson, assistant superintendent of the Duluth plant, replied in accepting the trophy.

As an added feature of the celebration the 955 gas-filled balloons were brought on the field by 32 boy scouts, each scout representing one month of the mill's consecutive no-accident record. These boys formed the letters "S A F E T Y" and at a signal all 955 balloons were released simultaneously

Each of the balloons carried a tag bearing a brief safety message, a "Safety Crusader" badge of the National Safety Council and a reproduction of a safety poster. Prizes were offered to the finders of balloons traveling farthest from the Duluth plant. Each tag also carried the name of an employe, and prizes were awarded to the employes whose balloons traveled farthest.

A picnic luncheon and athletic events followed the ceremony.

Foreign Abstracts and Patent Review

Why Cement Clinker Made from Slag Disintegrated. Jean Mundorf states that sometimes large portions of a shaft-kiln cement clinker, which is prepared from 40% blast-furnace lump slag and 60% limestone, were subject to sudden changes. While cooling, large pieces of the clinker would break up within three minutes into a flour. Test specimens consisting of 55% of this disintegrated clinker mixed with 43% good blast furnace slag and 2% gypsum showed a compressive strength of only 44 kg. per sq. cm. after 3 days, while similar specimens but containnig 55% of the sound clinker showed a compressive strength of 180 kg. per sq. cm. after 3 days.

The reason for the disintegration of the clinker into flour was found to be that the blast furnace slag employed would suddenly carry considerable metallic iron. Lump slags were analyzed which contained besides 4 to 5% FeO as much as 8% metallic iron (Fe). *Due to this high iron content there is a much quicker sintering of the clinker.* It fuses too early and becomes overburned, which prevents the passing of sufficient air through the fused lumps. The coke still available is not burned as an oxidizing agent, but as a reducing agent. Thereby the oxygen atom is also removed from the FeO, so that it reduces the metallic Fe. The analysis of the clinker showed for all specimens an increase in ignition value conditioned by the oxidation of the metallic Fe or FeO to Fe_2O_3. Similarly, sulphide in the form of sulphur was found, which really should have been gotten rid of as SO_2 in the waste gases.

Fine fragments and grains of iron could be picked up from the disintegrated clinker by use of a magnet. Since the metallic Fe as also the FeO does not enter in combination with the CaO of the clinker, an excess of lime occurs, and there is low strength and unsoundness in the cement. After the high iron bearing lump slag had been substituted with well granulated, low iron bearing slag, which as a precaution was passed over a magnetic separator, the disintegration of the clinker was eliminated and the analysis and strengths were again normal. The 8% CO, which had been in the waste gases, disappeared again. The drawing of the clinker became easier.—*Tonindustrie-Zeitung* (1930) **54**, 35, p. 594.

Moduli Versus Lime Satiation for Computing Portland Cement Compounds. H. Kuehl explains why he introduced the silicate modulus and the iron modulus, and why previously Michaelis introduced the hydraulic modulus. They introduced these moduli to be used as a makeshift in correctly proportioning the raw materials for making the cement, for they found it useless to figure with equivalency figures as long as the chemical constitution of the portland cement clinker was not fully cleared up.

The fact that LeChatelier, Newberry and others have figured for years with molecular proportions instead of percent proportions. indicates, however, that something else should take the place of these unscientific moduli. Another objection to the conception of moduli, as pointed out by Spindel, is the illogical use of the terms (see *Tonindustrie-Zeitung*, 1927, p. 1240), which, according to Spindel, should be replaced with Ca-modulus, Si-modulus, Al-modulus, Fe-modulus, R-modulus, the latter being the sum of alumina and ferric oxide.

At this time H. Kuehl finds a different reason for the belief that the time is not far off when the old conceptions of hydraulic modulus, and perhaps also of the silicate modulus and the iron modulus must be abandoned. If a cement is to be made which will have a relatively similar lime content, or, in Kuehl's words, an identical degree of lime saturation (or satiation), and different raw materials must be used of which some might be low in silicic acid and others high in silicic acid, the hydraulic modulus must be different for each raw material; this fact already shows that the hydraulic modulus is a very incomplete way of expressing the lime content of a cement. If it were known *what* maximum quantity of lime can fix a given quantity of silic acid, alumina and ferric oxide in a best portland cement clinker, it could be agreed to start from this *theoretically correct* lime content and compare it with the *actual* lime content of the cement to be estimated. Kuehl now investigates if there is such a possibility.

First, it is necessary to know if the *maximum* quantity of lime which can be fixed chemically by the silicic acid, alumina and iron oxide, is also the *correct* quantity of lime. Kuehl concludes from the work of Lerch (paper 20, Portland Cement Association Fellowship, U. S. Bureau of Standards) which he reviews, that exactly that cement which contains the maximum lime-bearing compounds of silicic acid, of alumina, and of ferric oxides, is also the best cement that can be made with given hydraulic factors. For Lerch found that no unsoundness due to lime action is caused in portland cement manufactured from clinker prepared of pure compounds, among them particularly tricalcium silicate, tricalcium aluminate, and dicalcium ferrite.

Kuehl, in referring also to his formula, and assuming therefore that 1 molecule of silicic acid can fix 3 molecules of lime; 1 molecule of alumina also 3 molecules of lime; and 1 molecule of ferric oxide 2 molecules of lime in the maximum theoretical case, expresses the *theoretically maximum possible* lime content by the following formula: $CaO = 2.785\ SiO_2 + 1.646\ Al_2O_3 + 0.702\ Fe_2O_3$, which in a simplified form is $CaO = 2.8\ SiO_2 + 1.65\ Al_2O_3\ 0.7\ Fe_2O_3$.

Presuming that this is the theoretically maximum *possible* quantity of lime for given quantities of silicic acid, alumina and ferric oxide, the *degree of lime saturation* of a cement is obtained when its *actual* lime content is compared to the *theoretically maximum possible* lime content of the cement, that is, when the quotient is formed of both. Accordingly, the degree of lime saturation S of a given cement is given by the formula

$$S = \frac{CaO}{2.8\ SiO_2 + 1.65\ Al_2O_3 + 0.7\ Fe_2O_3}$$

The following Table I gives besides the chemical composition of three different cements and their hydraulic, silicate and iron moduli also their degree of lime saturation:

TABLE I

	Cement		
	High in silicic acid	Normal	Low in silicic acid
Silicic acid	24.51%	20.43%	17.32%
Alumina	4.33%	6.70%	7.44%
Iron oxide	1.80%	3.51%	5.88%
Lime	64.36%	64.36%	64.36%
Remainder	5.00%	5.00%	5.00%
Hydraulic modulus	2.10	2.10	2.10
Silicate modulus	4.00	2.00	1.30
Iron modulus	2.41	1.91	1.27
Degree of lime saturation	0.835	0.910	0.992

In spite of the identical hydraulic modulus of 2.10 of these three cements, with different hydraulic factors, their degree of lime saturation differs considerably. Cements with a lime saturation of about 0.95 are high grade, of about 0.90 are ordinary. It must be remembered that the lime saturation 1.00 is an ideal limit figure which cannot be attained in practice by sintering.

According to present specifications, the hydraulic modulus 1.70 is the minimum hydraulic figure for cements, and the Table II shows the degree of lime saturation of three different cements, all having the same hydraulic factor proportions as in Table I above; but a correspondingly lower lime content.

TABLE II

	Cement		
	High in silicic acid	Normal	Low in silicic acid
Silicic acid	28.15%	23.46%	19.89%
Alumina	4.98%	7.71%	8.56%
Iron oxide	2.06%	4.02%	6.74%
Lime	59.81%	59.81%	59.81%
Remainder	5.00%	5.00%	5.00%
Hydraulic modulus	1.70	1.70	1.70
Silicate modulus	4.00	2.00	1.30
Iron modulus	2.42	1.92	1.27
Degree of lime saturation	0.676	0.736	0.802

Of these cements only the one with lime saturation 0.802 can be used, the others being too low in lime content. Accordingly, it would be well to drop the limit figures of

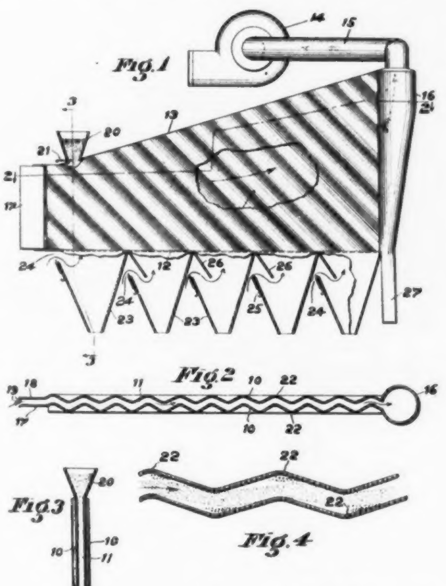
the hydraulic modulus from the cement specifications and put in its place the limit figures of degree of lime saturation: for example, that a portland cement should have a lime saturation of at least 0.75 or 0.80.

Kuehl believes that for the present the silicate and iron moduli should be retained and only the hydraulic modulus should be replaced by the degree of lime saturation—*Tonindustrie-Zeitung* (1930) **54**, 23, pp. 389-392.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Air Classifier. An invention in which the removal of the heavier particles from the air is promoted by providing the side walls of the classifier with inclined corrugations or ribs that serve to send downward the particles that work out of the path of the air into contact with the sidewalls.



Details of Stebbins air classifier

The heavier particles thus segregated may be secured by providing a series of collecting hoppers as shown in Fig. 1 at 23. Air introduced over these hoppers at 24 tend to drive the lighter particles back into the classifier. In the illustration, Fig. 1 is a cross-section of the air classifier, air being introduced from the atmosphere at 17 and regulated there by a swinging gate. It is brought into the device by suction fan 14. The material to be treated is introduced through the hopper 20.

Fig. 2 indicates narrow space between the walls. Fig. 3 is a sectional view at point 3. Fig. 4 is an enlarged view of the tortuous air passage and shows how centrifugal force tends to throw the heavier particles out as at 22. The corrugated sides serve to carry them down to the hoppers.—*Albert H. Stebbins, Los Angeles, Calif., United States No.* 1,759,959.

Mixing Concrete under Vacuum. This application for a patent covers a method of producing densified, de-aerated cement concrete which consists in mixing the ingredients in an open mixer until a homogeneous mass is secured and then to continue agitation under a vacuum. After the air is extracted the material is worked under normal atmospheric conditions.

The inventor describes several mixers, one with means to agitate the concrete in a fixed container with exhaust pump, the other having an exhausting device attached to a rotary mixer. The method is best described by referring to the accompanying illustrations.

Figs. 1 and 2 are a side and end elevation of a paddle-type mixer in which the mixing tank is non-rotating. The mixer shaft *h* propels the paddles (not shown). The tank *a* can be hermetically sealed with cover *c* operated by a toggle lever system *f*, f^1, f^2 through a transversing screw operated by hand wheel g^1. The tank can be tilted on shaft r^1 to discharge the contents. The air is exhausted through duct 8, separator 9, duct 10 and flexible branch 11 by pump 6. Branch 11 is fitted with a vacuum gage 12 and a valve 13 to admit atmospheric pressure when opening the tank.

Figs. 3 and 4 are details of a drum mixer which can be sealed on each side of the drum by plates 18. Flexible pipes 25 and 26 are for vacuum and water feed. When deaeration is completed the plates 18 are swung open clear of the usual feed or discharge mechanism and the mixture discharged by fixed inclined chute 34 and movable chute 35, as shown in Fig. 5, to a separate de-aerating chamber where the vacuum, by pump 48, is created in the same manner as with the non-rotating machine.—*Arthur Cyril Knipe, assignor to Modern Concrete Development Co., Ltd., London, England, United States No.* 1,766,911.

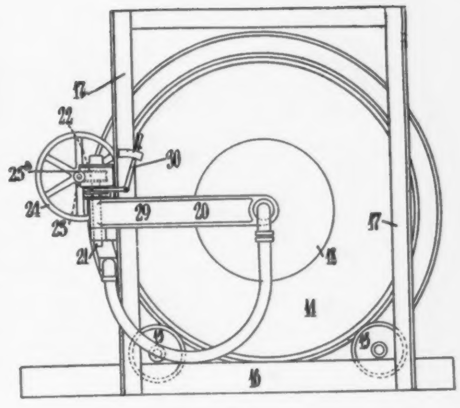


Fig. 3.

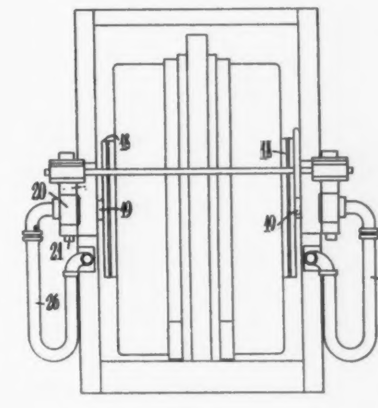
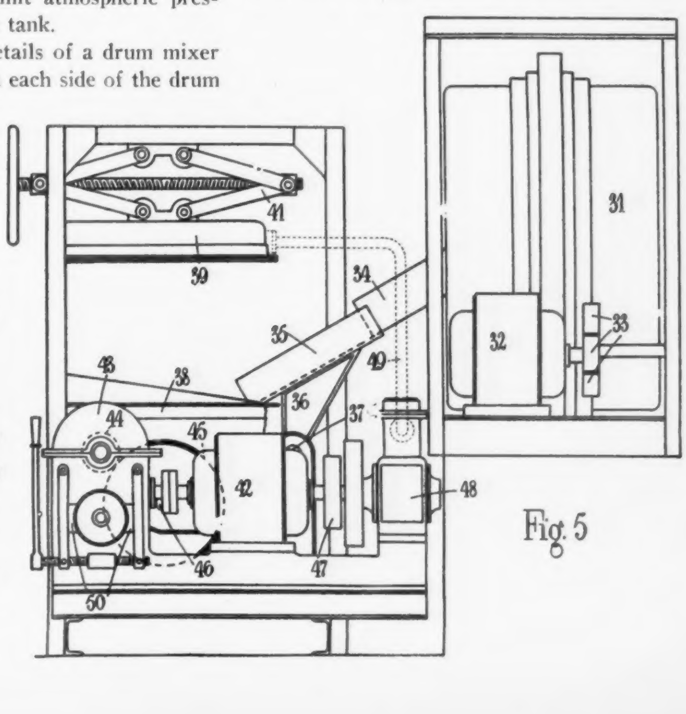


Fig. 4.



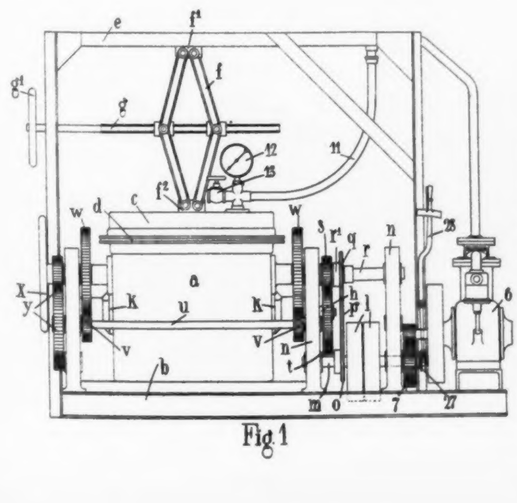


Fig. 1

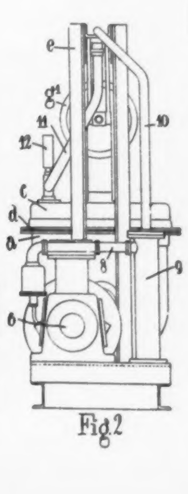


Fig. 2

Pertinent Paragraphs ¶

Interesting items from everywhere condensed and "abstracted" for the benefit of busy readers

By Hugh Sharp

THIS IS THE OPEN SEASON for "rock hounds" in Pennsylvania. The gentleman with the hammer, magnifying glass and note book is abroad in the land. He is either a member of the Pennsylvania Geological Survey, the United States Geological Survey or one of the numerous university professors who make their summer vacations profitable for research work. The topographic engineers of Pennsylvania have recently completed 13 quadrangles of 225 square miles each and there remain only 26 quadrangles to complete the mapping of the entire state. Among the projects completed or "in the works" are a survey of 25 Pennsylvania caves, a popular description of the state's geology and mineral resources, a report on clay resources, a study of building stones, report on limestones and one on slate. There also are several studies of petroliferous strata. The work is being done under the direction of Dr. George H. Ashley, state geologist.

~ ~ ~

THERE'S a young man down in Celina, Ohio, who handles a lot of cement daily. And he doesn't do it figuratively nor statistically. His name is Homer Sink, a fair-haired 24-year-old fellow from Lewisburg, Ohio. He works for Huron and Smalley, contractors, and his job is to load trucks from railroad cars. Every day Homer sinks his husky hands into 3000 bags. Let's see, 3000×94 is 282,000 lb. $\div$ 2000 = 141 tons. A lot of fellows would be sunk by any such job as Homer Sink's.

~ ~ ~

ONE OF Calvin Coolidge's recent newspaper articles advocated strongly the building of homes not only for the strengthening of the whole fabric of society but because present conditions make such activity most favorable. Letters and telegrams pouring in from economists, individuals and associations interested in home building hail the message from the Sage of Northampton as of incalculable value. Fenton B. Turck, Jr., chairman of the National Building Survey Conference, says Mr. Coolidge's message is "heartening to many whose perspective has been blurred through rapid changes in economic and business conditions of the past year."

STRIKING METHODS of photographing material for advertising purposes seems to be the trend these days. In its recent issue of "The Dragon," house publication, the Fafnir Bearing Co., New Britain, Conn., shows a startling print of bearings and containers. The picture man used some ordinary corrugated board paper for a background. The effect is unusual and makes the caption, "New Angles, New Backgrounds," fitting in its unique application. Some technical stories on mounting, interesting installations in various plants and new uses, all with pictures, make the magazine well worth reading. Pert Paragraphs has normal eye sight but suggests that the interesting page titled "Dragonettes," in small type, would cause less eye strain if "leaded up."

~ ~ ~

AT THE banquet held in connection with the 12th annual convention of British quarrymen the guests were treated to the unusual incident of having someone respond to the toast for the absent members. The member who assumed this responsibility was from Burma and happened to be in England at the time of the convention. In his speech he said he always made it a custom to drink a toast at the same time his fellow Britishers were toasting him in convention, but that he never knew exactly the hour which would synchronize. Nine o'clock is about 2:30 a.m. in Burma. To make sure he had the right time the Burma quarryman said he would start at 2 and finish at 3.

~ ~ ~

The Quarrelsome Trio

When you hark to the voice of the knocker,
As you list to his hammer fall,
Remember the fact
That the knocking act
Requires no brains at all.

When you list to the growl of the growler,
As you list to his ceaseless growl,
You will please recall
That a dog is all
It takes for an endless howl.

As you watch for the kick of the kicker,
As you notice his strenuous kick,
You'll observe the rule
That a stubborn mule
Is great at the same old trick.

The knocker, the growler, the kicker,
Fault-finders, large and small,
What do they need
For each day's deed?
No brains, no sense—just gall.

—L. G., in Dixie Doings of the Dixie Portland Cement Co.

AN UNUSUAL use for cement is revealed in an article appearing in *Universal Atlas Cement Dealer,* the Universal Atlas house organ. A picture is shown of two painters working on a suspended scaffold at what looks like "quite some high up." Perhaps you, too, have wondered just what holds the projecting beams from which the dangling scaffold ropes are hung. In this case the beams go back about 25 ft. on to the roof. The painters simply dropped a bag of cement over each beam end. Romance? No. They put their faith in Atlas.

~ ~ ~

KILN OPERATORS at the plant of the American Lime and Stone Co., Bellefonte, Penn., owned and operated by the Warner Co., Philadelphia, have an unusual record of long service. For instance, there's J. B. McNichol, superintendent, 48 years of age, who has been with the company 31 years. J. F. Stover, aged 77, has seen 45 years of employment. Three men have worked 31 years for the American company, one 26 years, two 25 years, one 23 years, two 19 and so on. Most of the crew have worked together for more than 20 years.

~ ~ ~

ABORIGINAL METHODS of quarrying and lime production are recalled in news dispatches reporting an unusual fire on the face of a wall of rock overlooking the White Salmon river in the state of Washington. Moss covering the bluff caught fire and the rock cracked from the heat, causing thunderous noise. Great boulders were loosened and rolled to the water's edge.

~ ~ ~

HERE IS, so far as we know, a new explanation of the origin of the word dolomite. A letter from the R. N. Horton Lime Co., Richlands, Va., tells us that there has always been a great deal of speculation regarding this point, but according to Thorp's Dictionary of Applied Chemistry, dolomite was named after D. G. Dolomiler, a French geologist, born in 1750, who died in 1801. Incidentally, the Horton quarry has eight varieties of limestone, one of which contains 99.10% carbonate of lime and .87% carbonate of magnesia.

~ ~ ~

BRICKS AND BUDGETS may seem, from the nature of the industry, to be incompatible, yet "Budget Methods of the Brick and Clay Industry" is the subject outlined in a pamphlet issued by the Policy Holders Service Bureau of the Metropolitan Life Insurance Co., New York City. An investigation to determine the extent to which budgeting methods have been used revealed widespread interest, but indicated that the budgeting principle was not very generally adopted. The book relates experiences of several firms using the budget control system and gives suggestions on periods and units, sales estimates, budgeting production, selling and administrative expenses, financial budgets and installment and enforcement.

Safety Engineering Brings Results

Applied to a Specific Sand and Gravel Operation

By J. J. Rosedale

Consulting Safety Engineer, San Francisco and Los Angeles, Calif.

IN JUNE, 1927, a safety department was organized for the Kaiser Paving Co.'s sand and gravel plant at Livermore, Calif., under my supervision. A high loss ratio had developed, giving the company a debit experience rating, and my first job was to make an analysis of the accidents which had occurred during the time the plant had been in operation.

This accident analysis showed that numerous accidents were due to unguarded machinery, unsafe practice in the operations of motor vehicles, in the handling of materials and objects, in the use of hand tools, etc. Other major classifications were falling and flying objects, falls of persons, burns, infections, foreign body in eye and nail punctures.

Safety Committee Organized

A safety committee was organized and the plant foreman was appointed safety inspector. Thorough bi-weekly inspections were begun by the safety inspector as well as periodic inspections by myself. All hazardous conditions found during these inspections were corrected at once. This was accomplished by making out a work order so as to have a proper record and expedite action in the matter.

Safety committee meetings have been held monthly, at which time the safety recommendations made by the inspector and by myself are discussed, as well as plans for forwarding the safety program.

A campaign of education was instituted and carried on continuously through the issuing of bulletins, posters and instructions and by giving talks frequently to the employes in regard to safe practices on their part and to obtain co-operation in this work.

As a result of this effort during the first year under this safety service, the plant operated with only six lost-time injuries, amounting to 37 days, and the entire cost of medical attention was $150.

Setback the Second Year

During the second year there were two major accidents, which spoiled the record, due to chance-taking on the part of the employes.

One of these men got in between two moving cars and pulled the drawbars between the couplings, which was in violation of the safety rules of the company. He had two of his fingers cut off.

The other accident was due to the donkey engineer running too fast past the hopper and striking one of the workmen who was breaking rock.

Third Year—No Lost-Time Accident

In the third year of this safety service, the plant operated without a lost-time accident and this for 84,000 man hours worked.

During this period a safety pledge card was issued to and signed by each employe in the plant and a safety contest was conducted. The plant was divided into three teams for this contest, i.e., "Bunkers," "Pit" and "Yard" teams, captained by the KEY man of each department. The first prize for the team making the best safety record during the year was $10 to each member of the team and the second prize was $5 for each member of the team.

As a result of this contest, one team won first prize and two teams tied for second place. The contest was sponsored by the plant manager of the company, T. M. Price, who awarded the prizes in person at a meeting of the employes.

Mr. Price expressed the attitude of the management towards the safety work in the following words:

"I am extremely proud of what we have accomplished in our safety work in 1929. To me this was largely due to the interest each of you took in the safety work and your personal endeavor to eliminate accidents and our company is to be congratulated in having the services of such a body of men as you are.

"When the safety work was first started two years ago, I am frank to say that the real reason was an attempt to reduce our terrific insurance rating on employes' compensation insurance. Since the work has been in progress I have come to have an entirely different conception of its benefits. I now believe that the real benefit is humanitarian; that is, the benefit that comes to the individual employe who is taught in a scientific manner how to avoid accidents. It is not a good thing for anyone to be physically injured; it hurts the improvement of a man's general condition, besides the real pain occasioned thereby, and the elimination of such injuries is a real personal benefit and should be desired by the employer as well as the employe.

"There is an additional benefit to the employer, besides the saving in insurance rates, and that is the loss involved in educating new men to take the places of those injured. I dare say that none of us really knows the real cost in breaking in a new man in the smallest job in this plant. In other words, when a man is so badly injured that he suffers a loss of time, there is a large cost to the company in teaching a new man to take his place, and preventing accidents prevents this cost."

Prize for Most Safety-Conscious Employe

Mr. Price was so pleased with the enthusiasm and co-operation shown during the safety contest that he offered an additional prize of $20 in gold for the ensuing year for the most *safety-conscious man* in the plant. This will be decided by a vote of all the employes of the plant.

In addition, Mr. Price also started a prize offering of $5 in gold monthly for the individual making the best safety suggestion and also for the individual making the best suggestion for the improvement of the products.

As a result of the campaign of education and of the contests and prize offerings, every employe in the plant is on the alert always and thus far this year there have been no lost-time injuries in the plant.

Some of the Profits

During the time safety work has been carried on in this plant 507 safety recommendations for the improvement of the physical conditions have been made and carried out, a constructive set of safety rules has been issued to all employes for safe practice in their work and the loss ratio has been reduced 92% during this period.

A course in first-aid was given by me to the KEY men in the plant, which has resulted in the proper care of the injured, preventing many infections, which had been very prevalent previously. This first-aid has also done a great deal toward promoting the spirit of safety-mindedness among the employes in the plant.

As the management expressed it at a meeting of the employes some time ago, this safety engineering service has increased production, promoted loyalty and co-operation among the employes and created a real working "family."

The Kaiser Paving Co. is absolutely sold on safety engineering service and is doing everything to foster this work, co-operating fully with the safety engineer in carrying out all recommendations and plans submitted by him for the improvement of the plant. The executives of the company are convinced that accident prevention is not only good

morals and good ethics, but good sound business as well.

My work is not confined to safety measures alone, but extends to welfare and personnel, such as the proper selection of employes, proper placement of workers, physical examination of employes, proper supervision of the medical for injured employes and the rehabilitation of the injured, also welfare work among the employes and their families.

In other words, my job is to see that everything possible is done for the safety, welfare and security of the employes in the plant.

July and Seven Month Records Show Accident Reduction

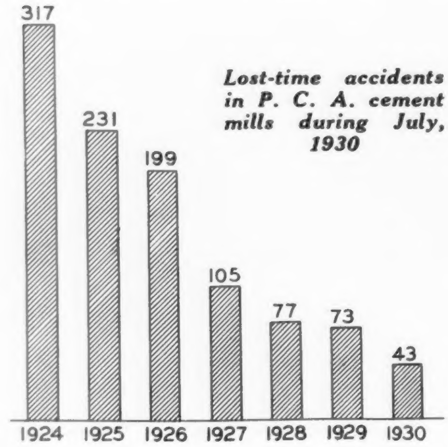
JULY ACCIDENT reports by the Portland Cement Association, covering the mills of its membership, indicate a new low level for the month, which was only slightly behind the record of June, which was the lowest in association history. During July, 1930, there were 42 lost-time accidents and one fatal accident as against 68 lost-time and five fatal accidents during July, 1929.

During the first seven months of 1930, 339 lost-time and 11 fatal accidents were reported as against 359 lost-time and 22 fatal accidents which occurred during the corresponding period of 1929. While the reduction of lost-time accidents between these two periods was only 6%, the reduction of fatalities was over 50%, a surprising as well as a most welcome improvement.

The number of cement plants in which no lost-time or fatal accident has occurred since January 1, 1930, is 58 as against 52 at the expiration of seven months of 1929. Thirty of the 58 accident-free plants have never had clear records of a year's duration, while 28 now on the roll of the association trophy club have already operated one or more calendar years without lost-time, permanent disability or fatal mishap. From the present outlook the Portland Cement Association must prepare to award even a greater number of trophies for 1930 than for 1929.

One of the most unexpected developments of the association's accident prevention work is the remarkable decline in the severity of accidents during the last few months. The "severity charge" against the individual mills includes the number of days actually lost by the injured to which are added arbitrary penalties of 6000 days for each death and lesser penalties for permanent disabilities, according to importance.

This severity charge for all mills and quarries in the association membership for the first seven months of 1930 is estimated at 108,000 days. The corresponding charge for a slightly smaller number of mills during the first seven months of 1929 was approximately 192,200 days. The apparent reduction in severity is about 44% and the figures indicate a saving of some 84,200 days. The large reduction in fatal accidents is largely responsible for the decline in the severity rating.



Lost-time accidents in P. C. A. cement mills during July, 1930

July Accidents

The only fatal accident of the month occurred in one of the finishing departments. As workmen were changing the location of a motor on the clinker drag platform an employe accidently threw in the compensator switch, bringing him in contact with "high" as well as the grounded side of the line. Death was immediate. The victim was 30 years old and left a widow and three children. The accident happened in a plant which has suffered only two other mishaps in three years.

Two hand-crushing accidents occurred, necessitating loss of one finger and one causing the loss of two fingers.

Cement and Quarry Sections Program at National Safety Congress

MEETINGS OF THE Cement and Quarry sections of the National Safety Congress loom large this year as outstanding features of the big national conference, to be held in several of the leading Pittsburgh hotels during the week of September 29 to

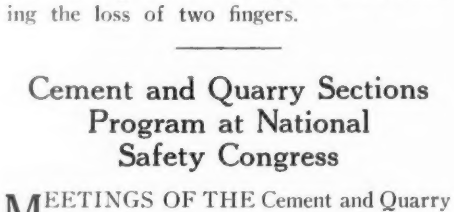


Chart showing remarkable decline of accidents during the last seven years

October 3.

Edward H. Parry, personnel and safety director of the Glens Falls Portland Cement Co., who is chairman of the Cement Section, and W. L. White, Jr., of the Medusa Portland Cement Co., who is chairman of the Cement Section program committee, have both been busy with plans for the meeting of cement men, while C. L. Worthen, vice-president of the Connecticut Quarries Co., who is chairman of the Quarry Section, and J. R. Boyd, secretary of the National Crushed Stone Association, have prepared a program of rare interest for those especially interested in quarrying.

The program of the joint sessions is as follows:

Cement Section

(Lower Level, Tudor Room, Fort Pitt Hotel)

TUESDAY AFTERNOON, SEPTEMBER 30

Annual report.

General chairman, Edward H. Parry.

Election of officers.

"Methods of Investigating Accidents"—P. L. G. Hasskarl, safety engineer, Pennsylvania Power and Light Co., Allentown, Penn.

Discussion.

Address—Thomas J. Quigley, chief, Mines and Quarries Section, Department of Labor and Industry, Harrisburg, Penn.

Dialogue—"Converting the Hard-Boiled Foreman." J. A. Voss, safety director, Republic Steel Corp., Youngstown, Ohio, and M. P. Grady, foreman, Pennsylvania Railway Shops, Canton, Ohio.

WEDNESDAY MORNING, OCTOBER 1

Round Table Discussion

"What Kind of Talk Should a Foreman Give to His Men?" Led by R. B. Fortuin, assistant to the general manager, Penn.-Dixie Cement Corp., Nazareth, Penn.

"What Effect Does Safety in the Plant Have on Safety in the Home?" Led by J. R. Cline, assistant superintendent, Universal Atlas Cement Co., Universal, Penn.

Address—Harry L. Sain, Fred G. Lange and Associates, Cincinnati, Ohio.

Cement and Quarry Sections, Joint Meeting

(Lower Level, Tudor Room, Fort Pitt Hotel)

WEDNESDAY, OCTOBER 1

Luncheon

Chairman, John B. John, chairman, Committee on Accident Prevention, Portland Cement Association, Chicago.

Address—Lt.-Col. Henry A. Reninger, past president, National Safety Council.

WEDNESDAY AFTERNOON, OCTOBER 1

"The Cost of an Accident"—Walter A. Darling, Cincinnati, Ohio.

Discussion.

"Mental Self Discipline Aids in Handling Oneself and Others, Especially in Relation to Accident Prevention and Safety"—Dr. H. S. Hulbert, Chicago.

Quarry Section

(Lower Level, Tudor Room, Fort Pitt Hotel)

THURSDAY MORNING, OCTOBER 2

"What the National Safety Council Is Doing for the Quarry Section"—J. V. Scott, director, service extension division, National Safety Council, Chicago.

Discussion.

Election of officers.

General round table discussion—"Saving Money Through Accident Prevention." Led by O. M. Graves, vice-president and general manager, General Crushed Stone Co., Easton, Penn., and Wm. E. Hilliard, general manager, The New Haven Trap Rock Co., New Haven, Conn.

An effort is being made to secure the attendance at the Cement Section meeting of those who are in responsible charge of safety work in all of the mills and quarries of the industry. Several proposals for changing and improving the activities of the section and the safety work in the individual mills are to be made at that time, with a view to accomplishing further large reductions in accidents during 1931.

The 1929 safety committee of the Vulcanite plant included the following: S. H. Harrison, chairman; Paul Brinker, James E. Seagraves, Walter Simpson, Tunis Gardner, Raymond Renkert, Brutus Sigafoos, Jason Todd, S. R. Pursel, Mrs. Kathryn W. Butler (nurse), John P. Brogan (nurse), James Pursell, Cleveland M. Rhen

Vulcanite Awarded Safety Trophy

THE HANDSOME CAST STONE trophy awarded by the Portland Cement Association to the Vulcanite Portland Cement Co. plant No. 3, for completing 1929 without a lost-time accident, was unveiled t the plant at Vulcanite, near Phillipsburg, N. J., on Tuesday, July 29.

For a number of years this plant has been a contender for trophy honors, only having suffered one lost-time mishap during the year 1928. The accident referred to occurred during February of that year and there has been no injury to any workman severe enough to cause even a day's loss of time since.

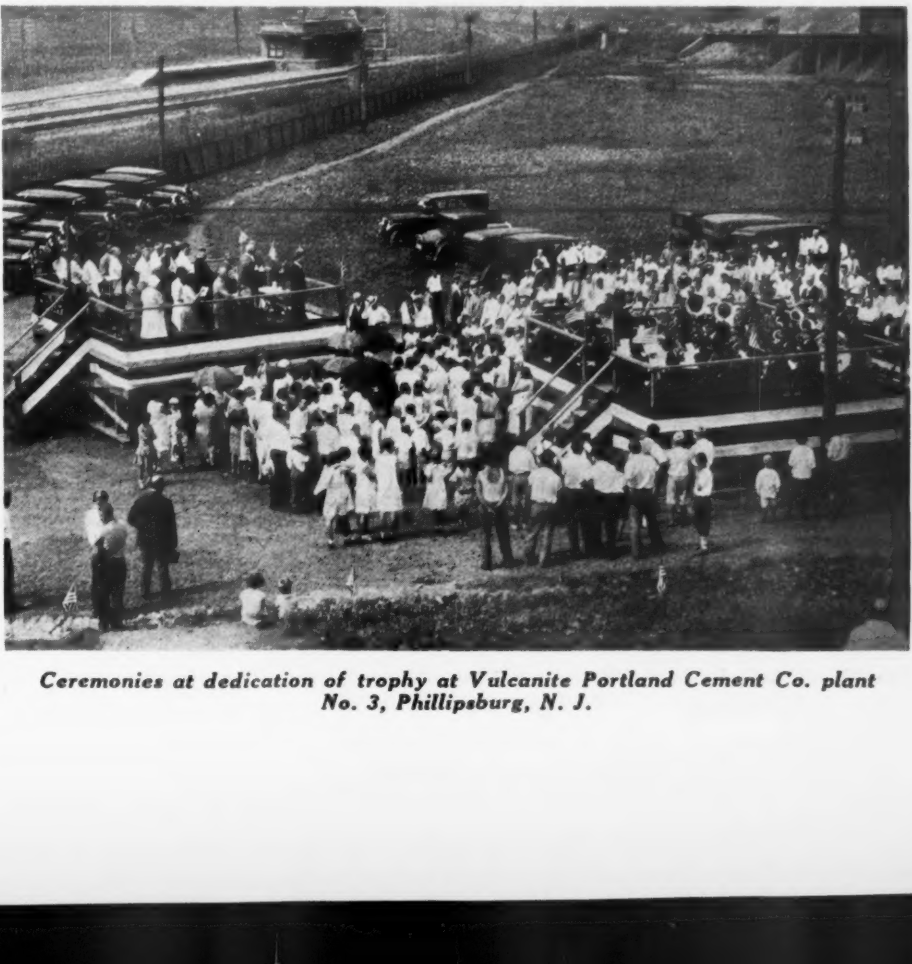
The ceremonies were in charge of S. Henry Harrison, assistant superintendent, who was forced to serve in the absence of W. R. Dunn, assistant to the president and works manager, who has directed the manufacture of Vulcanite cement since 1896. Mr. Dunn has been ill for a number of months and was kept at home on doctor's orders to avoid the extreme heat.

After the invocation by Rev. Andrew Szabo and the playing of "America" by the band, J. B. John, chairman of the committee on accident prevention of the Portland Cement Association, presented the trophy and dedicated it. The monument was then unveiled by Misses Elizabeth Sido and Anita Briglia, daughters of employes of the mill. Cleveland M. Rhen, one of the delegates sent to New York by this mill to receive the formal award, accepted the handsome concrete marker on behalf of the safety committee and workers.

W. D. Lober, president of Vulcanite, then spoke to the employes and their families, stressing the blessings of safe operation as a protection to the home and as a means of avoiding the tremendous wastes of time and money involved in getting hurt. He referred to the splendid history of the Vulcanite company and to the fact that the present organization was not only living up to the company's finest traditions but had improved upon them. Mr. Lober paid high compliment, as did Mr. John, to the great interest of the late J. B. Lober, first president of the Vulcanite company and for many years president of the Portland Cement Association, in the cause of safety. The elder Mr. Lober was first chairman and for many years a member of the committee administering accident prevention work in the cement industry and to his energy must be attributed much of the progress of this work during the earlier years.

Hon. John Roach, deputy commissioner of labor of New Jersey, followed President Lober with a splendid address in which he recalled triumphs in the field of industrial safety work and commended the efforts made by the cement industry along these lines. Mr. Roach has been in close touch with progress made by the Vulcanite mills.

The ceremonies closed with the "Star Spangled Banner" by the band, followed by the benediction by Reverend Szabo.



Ceremonies at dedication of trophy at Vulcanite Portland Cement Co. plant No. 3, Phillipsburg, N. J.

Fall of Roof Kills Four in Iowa Limestone Mine

FOUR EMPLOYES of the McManus Quarries Co., Keokuk, Iowa, were killed August 15, by a fall of stone from the roof of a limestone mine. T. J. McManus, of the company, has supplied this information:

"This accident happened while we were in the process of making our mine safer for the men. For the past year we have been working under a roof or ledge of rock 18 to 20 in. thick and above this roof is a ledge 6 ft. thick which we were working toward as our permanent roof. We had been shooting this old roof down and had it completely down with the exception of this one room.

"In shooting this old roof of this last room, when the shot was pulled, it did not bring the entire roof leaving a ledge about 6 to 12 in., which had been tested and seemed to be perfectly solid. We proceeded to clean out the stone which had fallen underneath this six inches of stone and had worked two days under it, keeping an eye on it and testing it regularly, but through some unforeseen cause it gave way while the men were under it.

"Before further operations are resumed, we intend to get the entire roof down, which will make our mine, in our opinion, and in the opinion of authority around here, perfectly safe. Our quarries have been mining for nine years, and in the last month we had our first fatal accident, which we feel is a very good record."

Quarry Accidents in 1928

INFORMATION and statistical tables on accidents in the stone-quarrying industry in 1928 are contained in bulletin No. 325, compiled by William W. Adams and issued by the United States Bureau of Mines.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, N. J.		.65	1.25	1.25	1.15	1.15
Attica and Franklinville, N. Y. (a)	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75		1.75	1.75
Buffalo, N. Y.	1.10	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.75	.95		1.40		
Leeds Jct., Me., and Milton, N. H.		.50	1.75	1.75	1.25	1.00
Machias Junction, N. Y.	.75	.75	.75		.75	.75
Montoursville, Penn.	1.00	.70	.50	.50	.40	.40
Northern New Jersey	.20–.50	.20–.50	.50–1.25	.80–1.25	.80–1.25	
Scarboro, Me.		1.00	2.25	2.25	2.00	2.00
Washington, D. C.	.60	.60	1.00	1.00	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.30	.15	.20	.30	.35	.35
Attica, Ind.	All sizes .75–.85					
Barton, Wis.		.40	.50	.60	.60	.60
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Crystal Lake, Ill.	.30	.15	.25	.30	.30	.40
Des Moines, Iowa	.40–.70	.40–.70	1.50–1.85	1.50–1.85	1.50–1.85	1.50–1.85
Dresden, Ohio		.60	.70–.80	.75	.75	.70
Eau Claire, Wis.		.40	.55	.85	.85	
Elkhart Lake and Glenbeulah, Wis.	.50	.40	.40	.50	.40	.50
Grand Rapids, Mich.		.50		.80	.80	.70
Greenville, Ohio	.50–.70	.40–.60	.50–.60	.50–.60	.50–.60	.50–.60
Hamilton, Ohio	.65–.75	.65–.75	.65–.75	.65–.75	.65–.75	.65–.75
Hersey, Mich.		.50		.60	.60	.70
Indianapolis, Ind.	.50.–.60	.25–.60	.40–.60	.45–.75	.45–.75	.45–.75
Kalamazoo, Mich.		.40–.50		.45–.55		.50–.75
Kansas City, Mo.	.70	.70		.80		
Mankato, Minn.	.55	.45	1.25	1.25	1.25	
Mason City, Iowa		.50		1.25	1.25	1.25
Milwaukee, Wis.		.86	.86	.96	.96	.96
Minneapolis, Minn.	.35	.35	1.25	1.35	1.35	1.25
Oxford, Mich.	.25–.35	.20–.30	.30–.40	.55–.75	.55–.75	.60–.75
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.65
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.40–.50					
Charleston, W. Va.	.70	1.25	1.25			
Eustis, Fla.		.40–.50				
Fort Worth, Tex.	.80–1.00	.80–1.00	1.25–1.50	1.00–1.25	1.00–1.25	1.00–1.25
Knoxville, Tenn.	.75	1.00	1.20	1.20	1.20	1.20
Roseland, La.	.25	.25	1.00	.70	.60	
WESTERN:						
Oregon City, Ore.	Sand for concrete, 1.00-1.50 per cu. yd. at plant					
Phoenix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60		1.20		1.15
San Gabriel, San Fernando Valleys, Cal.	.60	.60	1.10	1.10	1.10	1.10
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.25*

*Cu. yd. ‡Delivered on job by truck. (a) Prices on trucks; on cars, 65c per ton for all sizes.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25			4.00	
Cheshire, Mass.	Sand for soap, 5.75–7.00					5.00	
Columbus, Ohio	1.50	1.50	1.35	.90		3.50–4.50	
Dresden, Ohio	1.15–1.50	1.00–1.35	1.25–1.50	1.00–1.25	1.25		
Eau Claire, Wis.						2.50–3.00	
Elco, Ill.	Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton						
Kasota, Minn.							1.00
Montoursville, Penn.				1.25–1.50			
New Lexington, Ohio	2.00	1.25					
Ohlton, Ohio	1.75*	1.75*		2.00*	1.75*	1.75*	
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)					1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	
South Vineland, N. J.	Washed and dried silica sand, per ton, 2.25						

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio		1.00
Eau Claire, Wis.	4.30	1.00
Montoursville, Penn.		1.00
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.		1.75

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass. (in carload lots)	5.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
South Vineland, N. J.	1.75
San Francisco, Calif.	4.00–5.00
Silica and Mendota, Va.	2.50–3.00

Bank Run Sand and Gravel

Algonquin, Ill.¶ (½-in. and less)	.25
Buffalo, N. Y.—Sand, 1/10-in. down, 1.00; ¼-in. down, .75; gravel, all sizes	.75
Burnside, Conn. (sand, ¼-in. and less)	.75*
Crystal Lake, Ill.¶ (½-in. and less)	.25
Fort Worth, Tex.¶ (2-in. and less)	.65–.75
Gainesville, Tex.¶ (1½-in. and less)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (1-in. and less.)	.55
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ (1-in. and less)	.50
Mankato, Minn.†	.70
Oregon City, Ore.—River run	1.00–1.50
Winona, Minn.†	.60
York, Penn.—Sand, 1/10-in. down, 1.10; ¼-in. and less	1.00

***Cubic yard. †Fine sand, 1/-10-in. down. (a)** Cu. yd., delivered Chicago. ¶Gravel.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.		3.70	4.30¶
Atlanta, Ga.		2.19†	3.49¶
Baltimore, Md.		2.26*	3.56¶
Berkeley, Calif.		2.14	
Birmingham, Ala		1.85†	3.15¶
Boston, Mass.	.47	1.88†	3.27¶
Buffalo, N. Y.	.61¼	2.05†	3.35¶
Butte, Mont.	.90¼	3.61	
Cedar Rapids, Ia.		2.23*	
Centerville, Calif.		2.14	
Charleston, S. C.		a2.29†	3.26¶
Cheyenne, Wyo.		2.86	
Chicago, Ill.		1.95*	3.25¶
Cincinnati, Ohio		2.14*	3.44¶
Cleveland, Ohio		2.04*	3.34¶
Columbus, Ohio		2.12†	3.47¶
Dallas, Texas		†1.90	3.49¶
Davenport, Iowa		2.14*	
Dayton, Ohio		2.14†	3.44¶
Denver, Colo.	.66¼	2.65	
Des Moines, Iowa	.48½	1.94	
Detroit, Mich.		1.95*	3.25¶
Duluth, Minn.		2.04*	
Fresno, Calif.		2.33	
Houston, Texas		†2.00	3.73¶
Indianapolis, Ind.	.54¾	1.99*	3.29¶
Jackson, Miss.		2.29†	3.59¶
Jacksonville, Fla.		b2.34†	3.46¶
Jersey City, N. J.		2.13†	3.43¶
Kansas City, Mo.	.50½	2.02	3.22¶
Los Angeles, Calif.	.57½	2.30	
Louisville, Ky.	.55½	2.12–2.15†	3.42¶
Memphis, Tenn.		2.29†	3.59¶
Merced, Calif.		2.01	
Milwaukee, Wis.		2.10*	3.40¶
Minneapolis, Minn.		2.27*	
Montreal, Que.		1.60‖	
New Orleans, La.	.43	1.92†	3.22¶
New York, N. Y.	.50¾	2.03*	3.33¶
Norfolk, Va.		1.97†	3.27¶
Oklahoma City, Okla.	.61½	2.46	3.66¶
Omaha, Neb.	.59	2.36	3.56¶
Peoria, Ill.		2.12*	3.32¶
Pittsburgh, Penn.		1.95*	3.25¶
Philadelphia, Penn.		2.15*	3.45¶
Phoenix, Ariz.		3.51	
Portland, Ore.		2.50‡	
Reno, Nev.		2.76‡	
Richmond, Va.		2.32†	3.62¶
Sacramento, Calif.		2.25	
Salt Lake City, Utah	.70¼	2.81	
San Antonio, Texas			3.42¶
San Francisco, Calif.		2.24‡	
Santa Cruz, Calif.		2.10	
Savannah, Ga.		a2.29†	3.16¶
St. Louis, Mo.	.48¾	1.95†	3.25¶
St. Paul, Minn.		2.27*	
Seattle, Wash.		1.75	†2.50c
Tampa, Fla.		2.00†	3.41¶
Toledo, Ohio		2.10*	3.50¶
Topeka, Kan.	.55¼	2.21	3.41¶
Tulsa, Okla.	.58¼	2.33	3.53¶
Wheeling, W. Va.		2.02†	3.32¶
Winston-Salem, N. C.		2.44†	3.54¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.		2.15	
Bellingham, Wash.		2.25	
Bonner Springs, Kan.		1.85	
Buffington, Ind.		1.70	
Concrete, Wash.		2.65	
Davenport, Calif.		2.05	
Hannibal, Mo.		1.80	
Hudson, N. Y.		1.85	
Independence, Kan.		1.85	
Leeds, Ala.		1.70	
Limedale, Ind.		1.70	
Lime & Oswego, Ore.		2.50	
Nazareth, Penn.		2.15	
Northampton, Penn.		1.75	
Richard City, Tenn.		2.05	
Steelton, Minn.		1.85	
Toledo, Ohio		2.20	
Universal, Penn.		1.70	
Waco, Tex.		1.85	

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. ‡Subject to 2% cash discount. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‖Includes sales tax. (c) Quick-hardening "Velo."

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn.	.60	1.30	1.30	1.00	1.00	....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Jamesville, N. Y.	1.00	1.00	1.00	1.00	1.00	....
Oriskany Falls, N. Y.	.50–1.00	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35	1.00–1.35
Prospect Junction, N. Y.	.50– .80	....	1.00–1.15	1.00–1.10	1.00–1.10	....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Hillsville, Penn.	.85	1.35	1.35	1.35	1.35	1.35
Shaw's Junction, Penn. (e)	.85	1.20–1.35	1.20–1.35	1.20–1.35	1.40	1.30–1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	....	1.75	....	....	....
Afton, Mich.	....	....	....	.25	....	1.50
Cypress, Ill.	....	1.00	1.00	.90	.90	.85
Davenport, Iowa	1.20	1.50	1.50	1.30	1.30	1.30
Dubuque, Iowa	1.10	1.10	1.10	1.00	1.00	1.00
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	....
Greencastle, Ind.	1.25	1.10	1.00	.90	.90	.90
Lannon, Wis.	.80	.90	.90	.80	.80	.80
McCook, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.75–1.00	1.65–1.85	1.45	1.15	1.05	.95
Sheboygan, Wis.	1.10	1.10	....	....	....	....
Stone City, Iowa	.75	....	1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.70	....	1.60	....	1.60
Toronto, Canada	2.50	3.00	2.50	2.50	2.50	2.50
Waukesha, Wis.	....	.90	.90	.90	.90	....
SOUTHERN:						
Cartersville, Ga.	1.15	1.35	1.35	1.15	1.00	1.00
Chico, Texas	.75	1.30	1.25	1.20	1.10	1.00
Cutler, Fla.	.50r	1.75r	1.75r	1.75r	1.75r	1.50r
El Paso, Texas	.50– .75	1.25	1.25	1.00	1.00	1.00
Graystone, Ala.	Crusher run stone 1.00 per net ton					
Olive Hill, Ky.	.50	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.40	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.25	1.25	1.00	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
Rock Hill, St. Louis Co., Mo.	1.30–1.40	1.30–1.40	1.10–1.40	1.30–1.40	1.30–1.40	1.30–1.40
Stringtown, Okla.	1.00	1.15	1.20	1.15	1.00	1.00

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn.	1.20	1.60	1.45	1.35		1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Farmington, Conn.	1.00	1.30	1.30	1.00	1.00	....
Duluth, Minn.	1.00	2.25	1.75	1.65	1.35	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.25	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	1.15	1.25	1.50	1.30	1.15	1.10
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	....
Northern New Jersey	1.35–1.40	2.10	1.70–1.90	1.40–1.50	1.40–1.50	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
Toronto, Canada	4.70	5.80	4.05	4.05		....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	....	....	1.60	1.60	1.50	....
Chicago, Ill.—Granite	2.00	1.70	....	1.50	1.50	....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.50	1.40	1.25	1.15	....
Lohrville, Wis.—Granite	1.80	1.60	....	1.50	1.50	....
Middlebrook, Mo.—Granite	3.00–3.50	....	2.00–2.25	2.00–2.25	....	1.25–3.00
San Gabriel and San Fernando Valleys, Calif. (Granite)	1.10	....	1.10	1.10	....	1.30
(Basalt)	....	....	....	.85	....	....
Toccoa, Ga.—Granite	.50	1.35	1.35	1.25	1.25	1.20

(c) 1-in., 1.40. (d) 2-in., 1.30. (e) Price net after 10c disc. deducted. (h) Rip rap. (n) Ballast, R. R., .90; run of crusher, 1.00. (r) Cu. yd. (t) Rip rap, 1.20-1.40 per ton.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn.	1.25–1.50	.50– .60	1.00	.60– .80	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Reading, Penn.	2.00	1.00	....	1.00	....	....	....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	....
Jackson, Ohio	2.05	.65	1.80	1.45	1.05	1.30	....
Toledo, Ohio	1.50	1.10	1.35	.135	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05	1.05	1.65	1.45	1.45	1.45	....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*	....	1.15*	.90*	.90*	....

5c per ton discount on terms. †1½-in. to ¼-in., 1.05; ⅝-in. to 10 mesh, 1.25*; ⅝-in. to 0-in., 90c*; ¼-in. to 10 mesh, .80*.

Agricultural Limestone
(Pulverized)

Alton, Ill.—Analysis, 99% $CaCO_3$; 0.3% $MgCO_3$, 90% thru 100 mesh	4.50
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Carterville, Ga.	2.00
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton	6.00
Gibsonburg, Ohio—Bulk, 2.25; in bags	3.70
Hillsville, Penn.	2.10–4.50
Jamesville, N. Y.—Bulk, 3.50; in 80-lb. bags	4.75
Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh	3.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk	2.50
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.25
Atlas, Ky.—90% thru 4 mesh, 50c; 90% thru 100 mesh	1.00
West Rutland, Vt. — Analysis, 96.5% $CaCO_3$; 1% $MgCO_3$, in 100-lb. burlap bags, per ton	4.50

Agricultural Limestone
(Crushed)

Bedford, Ind.—Analysis, 98.44% $CaCO_3$; .83% $MgCO_3$; 90% thru 10 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	1.50
Chico, Tex.—(Agstone, ⅛-in. down), per ton	1.00
Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder	3.50
Cypress, Ill. — Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.25; 50% thru 100 mesh, 1.15; 90% thru 50 mesh, 1.15; 50% thru 50 mesh, 1.15; 90% thru 4 mesh, 1.15, and 50% thru 4 mesh	1.15
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton	1.20
Dubuque, Ia.—Analysis, 64.04% $CaCO_3$; 29.54% $MgCO_3$; 50% thru 100 mesh	1.10
Dundas, Ont.—Per ton	1.00
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh; bulk, per ton	1.15
Gibsonburg, Ohio—90% thru 10 mesh	1.00–1.50
Hillsville, Penn.—75% thru 100 mesh, 50% thru 100 mesh and 90% thru 50 mesh (sacked)	5.00
Lannon, Wis. — Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼-in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
Marlbrook, Va.—Precipitated lime-marl. Analysis, 96% $CaCO_3$; 1% $MgCO_3$, 90% thru 50 mesh, bulk, 2.25; in burlap bags	3.75
McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh	.80
Osborne, Penn.—100% thru 20 mesh, 60% thru 100 mesh, and 45% thru 200 mesh, per ton	a5.00
Piqua, Ohio—30%, 50% and 99% thru 100 mesh	1.00–4.00
Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags	3.50
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.15–1.70
Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk	3.50
100-lb. paper bags, 4.75; 100-lb., cloth	5.25
Waukesha, Wis.—90% thru 100 mesh, 4.00; 50% thru 100 mesh	2.10

*Less 25c cash 15 days. (a) Less 50c comm.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Hillsville, Penn.—Sacks, 5.10; bulk	3.50
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh (bags extra)	3.50
Piqua, Ohio—99% thru 100 mesh, bulk, 3.25; in 80-lb. or 100-lb. bags	4.25
Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.00

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.			11.40			17.50		20.65
Rambo, Penn.		9.50b	9.50b	9.50b	8.00d	9.50	8.50	
Knickerbocker, Devault and Lime Ridge, Penn.			8.50		6.50	8.00[3]	4.50	
CENTRAL:								
Afton, Mich.						10.50	6.50	
Cold Springs, Ohio		7.75	7.75				7.00	
Gibsonburg, Ohio	10.50				7.00	9.00[9]		
Little Rock, Ark.		14.40		14.40			11.90	17.90
Luckey, Ohio*	10.50	7.75	7.75				7.00	
Marblehead, Gibsonburg, Tiffin and White Rock, O., and Huntington, Ind.	10.50	7.75	7.75	11.00	7.00	9.00	7.00	
Milltown, Ind.		9.00	8.25	9.50	7.50		7.00	
Pittsburgh, Penn.	10.50	7.75	7.75		7.00	9.00	7.00	
Scioto, Ohio	10.50	6.50	6.50	7.50			6.50	
Sheboygan, Wis.		10.50	10.50	10.50			9.50	20.00
Wisconsin points		11.50					9.50	
Woodville, Ohio	10.50	7.75	7.75	11.50[24]	7.00	9.00[9]	7.00	15.00c
SOUTHERN:								
Cartersville, Ga.		9.00				13.50		15.00
Graystone, Ala.*	12.50	9.00		12.50			7.50	
Keystone, Ala.	16.00	7.00		7.00– 8.00			5.00a	11.50
Knoxville, Tenn.	16.00	7.00	7.00	7.00	5.50		5.00	23.00
Ocala, Fla.		10.50						
Pine Hill, Ky.		9.00	8.00	9.00				12.50
WESTERN:								
Colton, Calif.					9.50[4]			
Kirtland, N. M.							15.00	20.00
Los Angeles, Calif.	16.00	13.00	13.00				12.00	22.90
San Francisco, Calif.†	16.00	14.00	6.00–12.00	14.00–19.00	14.50[20]		11.00[19]	
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[20]		11.00[19]	

[1]Also 6.00. [2]To 1.35. [3]In 100-lb. bags. [4]To 11.85 per ton, granular but not ground, ¾-in. screen down to 14 mesh. [9]In 80-lb. paper. [10]Per bbl. [11]In wood; in steel, 11.60. [27]Less credit for return of empties. [19]To 14.50. [20]Also 13.00. [24]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime: finishing hydrate 20.00 per ton, pulv. lime 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. ‡To 6.00. ¶To 13.50. (a) To 6.00. (b) In 50-lb. paper. (c) In wood; in steel, 16.00. (d) In 80-lb. bags, for chemical uses.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 100% thru 200 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton. Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, 6.50 per ton in bulk, plus 10c per bag.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—						
Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—						
Gen. Bangor No. 1 clear	10.00–14.50	20.00	25.00	29.00	40.00	50.00
Gen. Bangor No. 1 ribbon	9.00–10.25	16.00	20.00	25.00	35.00	46.00
Gen. Bangor mediums	9.00–10.50					
Gen. Bangor No. 2 ribbon	6.75– 7.25					
Chapman Quarries, Penn.	7.75–11.25	13.00–15.00	19.00–22.00	23.00–28.00	27.00–30.00	32.00–35.00
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Pen Argyl, Penn.						
Graduated slate		16.00	23.00	27.00	37.00	46.00
No. 1 clear (smooth text)	7.25–10.50; Albion-Bangor medium, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mt., No. 1 & No. 2 clear	8.00– 9.50	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point

Chatsworth, Ga.:	
Crude talc, per ton	5.00
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	9.00
Pencils and steel crayons, gross	1.50– 2.00
Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¾% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh	7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.	
Clifton, Va.:	
Ground talc (150-200 mesh), in bags	10.00
Conowingo, Md.:	
Crude talc, bulk	4.00
Ground talc (150-200 mesh), in bags	14.00
Cubes, blanks, per lb.	.10
Emeryville, N. Y.:	
Ground talc (200 mesh), bags	13.75
Ground talc (325 mesh), bags	14.75
Hailesboro, N. Y.:	
Ground talc (300-350 mesh), in 200-lb. bags	15.50–20.00
Henry, Va.:	
Crude (mine run), bulk	3.50– 4.50
Ground talc (150-200 mesh), bags	6.25– 9.75
Joliet, Ill.:	
Ground talc (200 mesh) in bags:	
California talc	30.00
Southern talc	20.00
Illinois talc	10.00
Los Angeles, Calif.:	
Ground talc (150-200 mesh), in bags	15.00–25.00
Natural Bridge, N. Y.:	
Ground talc (325 mesh), bags	10.00–15.00

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-70%	3.50– 4.00
Mt. Pleasant, Tenn.—B.P.L. 76-78%	6.75

Ground Rock

(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65-70%	3.50– 4.00
Mt. Pleasent, Tenn.—Lime Phosphate: B.P.L. 73.25%	11.80
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00– 5.50

Florida Phosphate

(Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines	
68/66% B.P.L.	3.15
70% minimum B.P.L.	3.75
72% minimum B.P.L.	4.25
75/74% B.P.L.	5.25
77/76% B.P.L.	6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	100.00–125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, Bristol and Cardigan, N. H.—Per ton:	
Punch mica, per ton	150.00–240.00
Mine scrap	22.50
Mine run	325.00
Clean shop, scrap	25.00
Roofing mica	37.50
Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh	60.00
Spruce Pine, N. C.—Mine scrap, per ton	20.00
Trenton, N. J.—Mine scrap, per ton, f.o.b. mines	18.00

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	Plaster Board ¼x32x36". Per M Sq. Ft.	Plaster Board ⅜x32x36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Centerville, Iowa			6.00	7.00		7.50	8.50	10.50a					
East St. Louis, Ill.—Special	Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton, floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.												
Fort Dodge, Iowa	2.50	6.00	6.00	7.00	9.00	9.00	11.50	8.00	16.00	20.00	15.00		25.00
Grand Rapids, Mich. (h)			7.00	9.00	9.00d	9.50d	19.50	8.00d	26.00	20.00d			25.00
Los Angeles, Calif. (b)	3.90	7.50	7.00–7.50	8.00–8.20	9.00		9.00						
Medicine Lodge, Kan.							11.50d		16.00d				
Oakfield, N. Y.	3.00			6.00	9.00d	9.00d		6.00					
Port Clinton, Ohio	3.00	4.00	6.00	9.00	9.00	9.00	20.00	8.00	25.50	20.00i		15.00	25.00
Portland, Ore.	7.50		11.50d	16.00d									
Providence, R. I. (x)				12.00–13.00e									
San Francisco, Calif.	6.00		10.20d	13.90d									
Seattle, Wash.	6.60		10.00d	14.00d									
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00					20.00	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) White molding. (b) Plasterboard, ⅜x32x36-in., 16c per yd. (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (g) ⅜x48-in. by 3 to 4 ft. long. (h) Gypsum lath, per M sq. ft., 15.00. (i) To 26.00. (x) "Fabricate" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7¼c-8¼c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, 12.00 per ton in bags; bulk, per ton	......	7.50
Crown Point, N. Y.—Mica Spar	......	¶9.00–‖12.00
Davenport, Iowa — White limestone, in bags, per ton	‖6.00	‖6.00
Harrisonburg, Va.	12.50–14.50	......
Middlebrook, Mo.—Red	......	20.00–25.00
Middlebury, Vt. — Middlebury white	......	¶9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	......	c5.50
Phillipsburg, N. J.—In bags	......	10.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif.—"Nat-rock" roofing grits	......	12.00–20.00
Tuckahoe, N.Y.—Tuckahoe white	7.00	......
Warren, N. H. (d)	......	¶8.00– 8.50
Whitestone, Ga.	......	10.00

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton	18.00

Potash Feldspar

Bedford, Va.—Color, white; analysis, K_2O, 12.5%; Na_2O, 2%; SiO_2, 66.5%; Fe_2O_3, 0.08-0.12%; Al_2O_3, 18.5%, crude feldspar, bulk	6.50– 7.50
Keystone, S. D.—Color, white; analysis, K_2O, 12%; NaO, 2.50%; SiO_2, 65%; Fe_2O_3, 0.05%; Al_2O_3, 19%, pulverized, 99% thru 200 mesh; in bags, 16.00; bulk	15.00
Crude, in bags, 9.00; bulk	7.50
Erwin, Tenn.—White; analysis, K_2O, 10.50%; Na_2O, 2.76%; SiO_2, 67.92%; Fe_2O_3, .07%; Al_2O_3, 18%, pulverized, 99% thru 200 mesh, in bags, 16.20; bulk	15.00
Crude, in bags, 8:20; bulk	7.00
Rumney and Cardigan, N. H. — Color, white; analysis, K_2O, 9-12%; Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk	7.00– 7.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk (bags, 15c extra)	18.00

Cement Drain Tile

Graettinger, Iowa — Drain tile, per foot; 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Grand Rapids, Mich.—Drain tile, per 1000 ft.	
4-in.	36.00
6-in.	66.00
8-in.	100.00
10-in.	150.00
12-in.	210.00
Longview, Wash.—Drain tile, per 100 ft.	
3-in.	5.00
4-in.	6.00
6-in.	10.00
8-in.	15.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00

Chicken Grits

Centerville, Iowa	9.25
Cypress, Ill.—(Agstone)	1.15
Belfast, Me.—(Agstone), per ton, in carloads	10.00
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per 100-lb. sack	1.00
Coatesville, Penn.—(Feldspar), per ton, in bags of 100 lb. each	8.00
Cranberry Creek, N. Y.—Per ton, in carload lots, in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton	6.00
El Paso, Tex.—(Limestone), per 100-lb. sack	.75
Los Angeles, Calif.—(Gypsum), per ton, including sacks	7.50– 9.50
Middlebury, Vt.—Per ton (a)	10.00
Piqua, Ohio—(Pearl grit), No. 1 and No. 2	1.00– 4.00
Port Clinton, Ohio—(Gypsum), per ton	6.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	‖7.50–‖9.00
Wisconsin points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis. (at plant)	9.50
Dayton, Ohio	12.50
Detroit, Mich.	13.00–15.50
Farmington, Conn.	16.00
Flint, Mich.	*14.00–15.50b
Grand Rapids, Mich.*	14.50
Iona, N. J.	10.50–12.00
Jackson, Mich.	13.00
Madison, Wis.	12.50a
Milwaukee, Wis.	13.00*
Minneapolis and St. Paul, Minn.	9.50*
Mishawaka, Ind.	11.00
New Brighton, Minn.	8.00
Pontiac, Mich.	12.00
Portage, Wis.	15.00
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.00
Sebewaing, Mich. (at yard)	12.50
South River, N. J.	11.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada	12.00–b13.00*
Wilkinson, Fla.—White, 10.00; buff	14.00
Winnipeg, Canada	15.00

*Delivered on job. (a) Less 50c disc. per M 10th of month. (b) 5% disc., 10 days. (c) Delivered in city.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Appleton, Minn.	18.00–20.00
Franklin Park, Ill.:	
8x8x16. Per 1000	180.00
Chicago, Ill.:	
8x 8x16. Each	.21†
8x 8x16. Each	.18b
8x10x16. Each	.25†
8x10x16. Each	.22b
8x12x16. Each	.28†
8x12x16. Each	.25b
Columbus, Ohio: 8x8x16	14.00b–16.00a
Forest Park, Ill.	21.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Lexington, Ky.:	
8x8x16	a18.00*
8x8x16	b15.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.
†Rock or panel face.
(a) Face. (b) Plain.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Clyde, Ill.—French tile, 8½x15 in., per sq., 9.50–12.00; Spanish, 8½x15 in., per sq., 10.00–12.00; English Shingle, 7¼x12½ in., per sq., 13.50–15.50; Closed End Shingle, 8x12½ in., per sq.	11.00–13.00
Detroit, Mich.—5x8x12, per M	67.50
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Lexington, Ky.—8x15, per sq.:	
Red	15.00
Green	18.00
Longview, Wash.:	
4x6x12-in., per 1000	55.00
4x8x12-in., per 1000	65.00

Cement Building Tile

Chicago District (Haydite):	
8x 4x16, per 1000	140.00
8x 8x16, per 1000	200.00
8x12x16, per 1000	300.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Lexington, Ky.:	
5x8x12, per 1000	55.00
4x5x12, per 1000	35.00
Longview, Wash. (Stone Tile):	
4x6x12, per 1000	57.50
4x8x12, per 1000	65.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	......
Chicago District "Haydite"	14.00	......
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	10.00	......
Forest Park, Ill.	......	37.00
Longview, Wash.	16.50	23.00– 40.00
Milwaukee, Wis.	14.00	20.00
Omaha, Neb.	18.00	30.00– 40.00
Philadelphia, Penn.	15.50	......
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	22.50– 25.00
Rapid City, S. D.	18.00	25.00– 40.00

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.	......	53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.	......	55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	40.00	52.50	70.00
Patchogue, N. Y.	......	60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10-in.	12-in.	15 in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich.(b)																	
Sewer	......	.12	.18	.27⅓	.35	.47	.92½	1.11	......	1.66½	2.47	2.73⅓	......	......	......	......	......
Culvert	......	......	......	.57	.67	.93	1.20	......	......	1.80	2.10	2.25	3.35	4.00	5.60	6.90	7.85
Indianapolis, Ind. (a)	......	......	......	.75	.85	.90	1.15	......	......	1.60	......	2.50	......	......	......	......	......
Newark, N. J. (d)	......	......	......	......	.90	1.15	1.50	......	......	1.85	2.35	2.76	3.77	4.93	6.21	7.66	9.28
Unreinforced	......	.16	.25	.37	......	......	......	......	......	......	......	......	......	......	......	......	......
Norfolk, Neb. (b)	......	......	......	.90	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Tiskilwa, Ill. (rein.)	......	......	......	.75	.85	.95	1.20	1.60	......	2.00	......	2.75	3.40	......	6.50	......	10.00
Tacoma, Wash.	.14	.16	.22	.32	.45	.64	.90	......	......	......	......	......	......	......	......	......	......
Wahoo, Neb. (c)	......	......	......	......	.85½	......	1.14	......	......	1.81	......	2.47	3.42	4.13	5.63	6.49	7.31

(a) 24-in. lengths. (b) Sewer, 21-in., 1.48; culvert, 21-in., 1.45. †21-in. diam. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced; 21-in., 1.69; unreinforced, 21-in., 1.26; 5% cash discount.

Portland Cement Output in July

Business Better Than for June—Slightly Under July, 1929

THE PORTLAND CEMENT industry in July, 1930, produced 17,080,000 bbl., shipped 20,147,000 bbl. from the mills and had in stock at the end of the month 26,298,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in July, 1930, showed a decrease of 1.4% and shipments a decrease of 0.8% as compared with July, 1929. Portland cement stocks at the mills were 7.2% higher than a year ago.

The statistics here presented are compiled from reports for July, from all manufacturing plants except three, for which estimates have been included in lieu of actual returns.

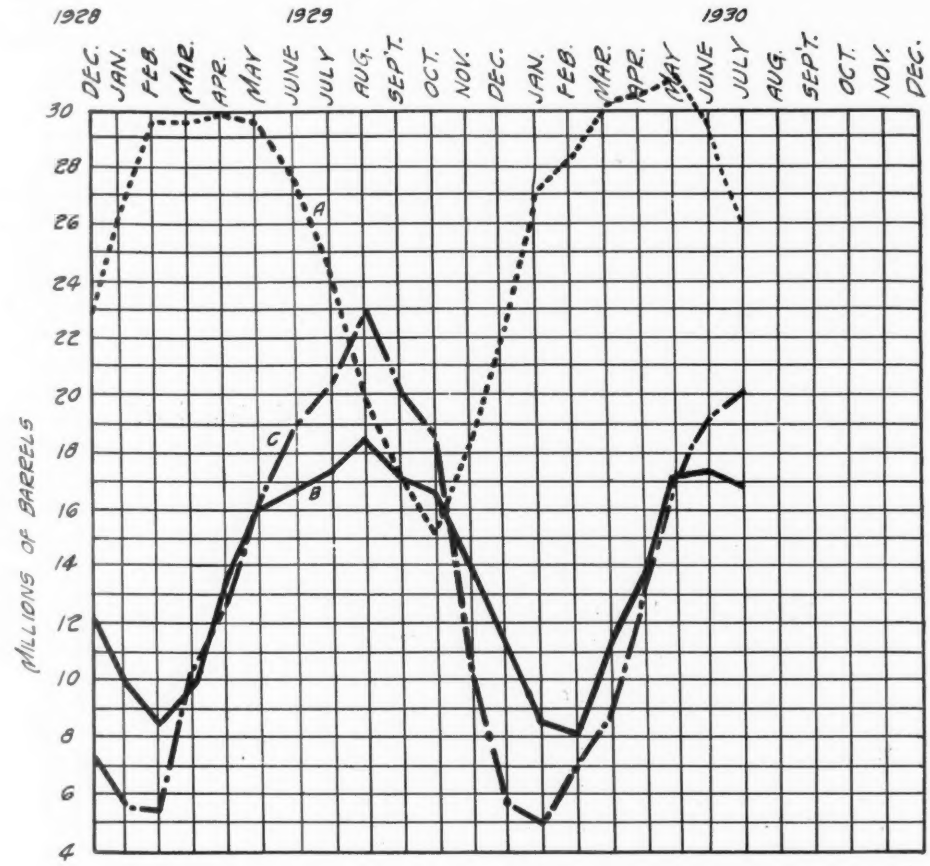
In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 166 plants at the close of July, 1930, and of 163 plants at the close of July, 1929. In addition to the capacity of the new plants which began operating during the 12 months ended July 31, 1930, the estimates include increased capacity due to extensions and improvements at old plants during the period.

RELATION OF PRODUCTION TO CAPACITY

	July 1929 Pct.	July 1930 Pct.	June 1930 Pct.	May 1930 Pct.	April 1930 Pct.
The month	80.4	77.8	81.4	78.9	64.0
12 months ended	68.9	66.1	66.4	66.2	66.0

Distribution of Cement

The following figures show shipments by states during May and June, 1929 and 1930.



(a) Stocks of finished portland cement at factories; (b) production of finished portland cement; (c) shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN MAY AND JUNE, 1929 AND 1930, IN BARRELS*

Shipped to	1929—May	1930	1929—June	1930
Alabama	172,938	129,594	156,828	124,375
Alaska	1,641	2,068	1,564	2,961
Arizona	57,318	41,429	76,157	41,057
Arkansas	98,331	131,701	149,067	175,644
California	977,113	877,635	981,611	844,399
Colorado	106,513	109,098	105,289	108,405
Connecticut	202,140	211,543	192,236	191,348
Delaware	35,091	38,168	45,544	59,042
District of Columbia	109,581	96,091	110,966	80,561
Florida	105,045	104,418	91,946	89,285
Georgia	121,684	135,715	117,783	142,7
Hawaii	32,262	29,558	22,254	15,182
Idaho	35,169	22,081	31,802	31,356
Illinois	1,583,290	1,038,904	1,780,688	1,212,319
Indiana	474,599	637,605	635,341	820,836
Iowa	579,190	1,067,232	728,393	1,126,961
Kansas	258,378	270,178	229,267	245,344
Kentucky	146,423	122,507	164,656	115,398
Louisiana	121,576	311,868	113,837	306,306
Maine	56,851	79,871	65,594	89,475
Maryland	235,589	331,582	244,635	267,222
Massachusetts	303,692	325,910	293,455	286,925
Michigan	1,192,634	1,022,121	1,486,439	1,164,439
Minnesota	348,850	501,896	456,148	627,906
Mississippi	79,718	44,775	73,548	51,847
Missouri	436,246	734,806	567,722	727,279
Montana	76,909	37,558	82,861	42,649
Nebraska	140,036	164,983	152,570	239,606
Nevada	16,672	15,133	14,091	16,830
New Hampshire	70,122	66,250	73,359	75,978

Shipped to	1929—May	1930	1929—June	1930
New Jersey	890,487	712,665	909,551	763,411
New Mexico	28,894	32,693	32,003	30,974
New York	2,130,573	2,032,025	2,493,401	2,331,986
North Carolina	222,453	133,974	179,957	111,543
North Dakota	58,414	43,316	81,746	63,127
Ohio	990,025	1,091,994	1,192,848	1,119,351
Oklahoma	270,643	364,053	286,697	353,241
Oregon	94,249	89,175	95,717	99,177
Pennsylvania	1,296,266	1,559,467	1,467,886	1,793,487
Porto Rico	300	5,265	2,800	250
Rhode Island	80,975	87,710	72,067	75,394
South Carolina	139,561	80,910	126,369	83,713
South Dakota	54,123	51,745	64,846	73,344
Tennessee	248,286	229,121	349,140	284,045
Texas	622,377	583,004	675,511	630,469
Utah	67,602	54,023	59,003	47,872
Vermont	83,862	55,676	130,517	72,329
Virginia	190,663	182,283	187,160	156,599
Washington	208,716	324,551	244,546	347,994
West Virginia	115,718	175,547	153,996	174,962
Wisconsin	633,405	564,324	786,307	751,985
Wyoming	20,364	18,818	27,961	22,374
Unspecified	0	13,660	13,536	5,268
	16,623,557	17,188,277	18,879,216	18,716,552
Foreign countries	82,443	35,723	69,784	64,448
Total shipped from cement plants	16,706,000	17,224,000	18,949,000	†18,781,000

*Includes estimated distribution of shipments from three plants in May and June, 1929, and in June, 1930; from two plants in May, 1930.
†Revised.

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production	1930	Stock at end of month 1929	1930
January	12,012,000	10,504,000	9,642,000	9,646,000
February	11,255,000	10.008,000	12,436,000	11,572.000
March	12,450.000	13,045,000	14,948,000	13,503.000
April	14,166,000	15,025,000	15,479,000	15,164,000
May	15.444.000	16,607.000	14,911.000	14.668.000
June	15,312,000	*15,895,000	13,587,000	*13,452,000
July	15,214,000	15,069,000	11,619,000	11,600,000
August	15,829,000	....	8,995,000	....
September	15,165,000	....	7,009,000	....
October	15,515,000	....	5,934.000	....
November	14,087,000	....	6,134,000	....
December	12,539,000	....	7,526,000	....

*Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JULY, 1929 AND 1930, AND STOCKS IN JUNE, 1930, IN BARRELS

District	Production 1929—July	—1930	Shipments 1929—July	—1930	Stocks at end of month 1929	1930	Stocks at end of June, 1930*
Eastern Penn., N. J., Md.	3,709,000	3,566,000	4,171,000	4,085,000	5,389,000	5,994,000	6,513,000
New York and Maine	1,366,000	1,249,000	1,609,000	1,524,000	1,765,000	1,462,000	1,737,000
Ohio, West'n Penn., W. Va.	2,139,000	1,973,000	2,282,000	2,358,000	3,435,000	3,522,000	3,908,000
Michigan	1,432,000	1,410,000	1,950,000	1,604,000	1,979,000	2,619,000	2,812,000
Wis., Ill., Ind. and Ky.	2,354,000	2,255,000	2,837,000	2,916,000	3,168,000	3,931,000	4,591,000
Va., Tenn., Ala., Ga., Fla., La.	1,250,000	1,213,000	1,543,000	1,327,000	1,818,000	1,887,000	2,001,000
East'n Mo., Ia., Minn., S. D.	1,570,000	1,832,000	2,223,000	2,540,000	3,092,000	2,495,000	3,203,000
Western Mo., Neb., Kansas, Okla. and Ark.	1,159,000	1,405,000	1,382,000	1,442,000	1,269,000	1,688,000	1,725,000
Texas	701,000	585,000	666,000	709,000	546,000	564,000	688,000
Colo., Mont., Utah, Wyo., Ida.	322,000	219,000	299,000	270,000	529,000	511,000	562,000
California	991,000	1,009,000	995,000	946,000	991,000	1,143,000	1,080,000
Oregon and Washington	322,000	364,000	362,000	426,000	544,000	482,000	544,000
	17,315,000	17,080,000	20,319,000	20,147,000	24,525,000	26,298,000	29,364,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1929 AND 1930, IN BARRELS

Month	1929—Production	—1930	1929—Shipments	—1930	Stocks at end of month 1929	1930
January	9,881,000	8,498,000	5,707,000	4,955,000	26,797,000	27,081,000
February	8,522,000	8,162,000	5,448,000	7,012,000	29,870,000	28,249,000
March	9,969,000	11,225,000	10,113,000	8,826,000	29,724,000	30,648,000
April	13,750,000	13,521,000	13,325,000	13,340,000	30,151,000	30,867,000
May	16,151,000	17,249,000	16,706,000	17,224,000	29,624,000	30,891,000
June	16,803,000	*17,239,000	18,949,000	*18,781,000	27,505,000	*29,364,000
July	17,315,000	17,080,000	20,319,000	20,147,000	24,525,000	26,298,000
August	18,585,000	......	23,052,000	......	20,056,000	......
September	17,223,000	......	19,950,000	......	17,325,000	......
October	16,731,000	......	18,695,000	......	15,381,000	......
November	14,053,000	......	11,222,000	......	18,213,000	......
December	11,215,000	......	5,951,000	......	23,550,000	......
	170,198,000	......	169,437,000	......	......	......

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN JULY, 1929 AND 1930, IN BARRELS

District	1929—Production	—1930	Stocks at end of month 1929	1930
Eastern Pennsylvania, New Jersey and Maryland	3,314,000	3,211,000	2,003,000	1,962,000
New York and Maine	1,108,000	1,124,000	1,014,000	737,000
Ohio, Western Pennsylvania and West Virginia	1,772,000	1,667,000	1,293,000	1,432,000
Michigan	1,287,000	1,138,000	1,034,000	1,351,000
Wisconsin, Illinois, Indiana and Kentucky	1,851,000	1,854,000	1,591,000	1,922,000
Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana	1,118,000	1,152,000	1,021,000	928,000
Eastern Missouri, Iowa, Minnesota and South Dakota	1,411,000	1,606,000	869,000	836,000
Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas	1,072,000	1,328,000	624,000	351,000
Texas	652,000	550,000	188,000	286,000
Colorado, Montana, Utah, Wyoming and Idaho	252,000	243,000	459,000	231,000
California	1,122,000	891,000	1,010,000	1,096,000
Oregon and Washington	255,000	305,000	513,000	468,000
	15,214,000	15,069,000	11,619,000	11,600,000

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1929 AND 1930

Month	1929—Exports Barrels	Value	—1930 Barrels	Value	1929—Imports Barrels	Value	—1930 Barrels	Value
January	78,639	$283,002	82,387	$293,135	151,302	$177,976	201,609	$207,461
February	58,886	225,590	64,267	217,798	118,930	123,123	114,455	119,717
March	69,079	235,164	117,563	357,896	131,909	112,788	43,622	59,981
April	64,145	218,316	57,419	200,217	89,668	114,281	140,871	178,226
May	57,955	219,366	57,423	198,170	200,646	267,854	94,696	111,998
June	96,055	287,612	82,077	223,639	203,545	228,170	55,356	74,370
July	71,992	247,177	......	......	182,098	199,960	......	......
August	60,013	225,762	......	......	183,938	199,403	......	......
September	86,268	308,631	......	......	112,372	152,239	......	......
October	101,359	337,839	......	......	172,566	187,504	......	......
November	53,378	198,197	......	......	96,568	95,844	......	......
December	88,403	297,255	......	......	84,358	79,098	......	......
	886,172	$3,083,911	......	......	1,727,900	$1,938,240	......	......

*Revised.

Exports and Imports

These figures were compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN JUNE, 1930

Exported to	Barrels	Value
Canada	4,216	$19,305
Central America	27,934	47,054
Cuba	4,760	11,268
Other West Indies and Bermuda	5,751	13,602
Mexico	12,380	35,158
South America	22,872	73,207
Other countries	4,164	24,049
	82,077	$223,639

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN JUNE, 1930

Imports from	District into which imported	Barrels	Value
Belgium	Maryland	155	$174
	Massachusetts	46,446	58,824
	New Orleans	1,200	1,405
	New York	3,700	8,506
	Porto Rico	3,050	4,074
	Total	54,551	$72,983
Canada	Maine & N. H.	8	$27
France	New York	213	$520
Germany	Los Angeles	312	$658
	New York	19	84
	Total	331	$742
Japan	Hawaii	253	$98
	Grand total	55,356	$74,370

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN JUNE, 1930

	Barrels	Value
Alaska	4,114	$10,761
Hawaii	29,644	70,719
Porto Rico	6,781	12,120
	40,539	$93,600

Cement and Steel in 1929

(An Editorial in *Iron Age*)

STEEL in 1929 made a new high production record by 9%. Portland cement did not do nearly so well, as output fell short of the previous record by 3%. Thus there was a 12-point divergence between steel and cement, in favor of the former.

Some 20 years ago steel makers were fearful that cement as a construction material would make inroads upon steel, but that has not occurred From 1909 to 1929 cement production increased by 162%, while steel production increased by 135%. The enormous amount of road building in recent years was not a visible prospect 20 years ago, and later those who did expect much road building were thinking of macadam rather than concrete. When concrete has been used in building construction it has taken some steel with it, and steel broadly has been benefited by the usefulness and cheapness of concrete, as some far-sighted men held would be the case.

Steel scored another point over cement, in its having a much larger percentage of employment of capacity. The Department of Commerce in issuing its annual report giving final figures for portland cement in 1929 compares production with capacity in existence at the end of the year, finding 65.8% utilization in 1929 against 72.3% in 1928. Steel ingot production in 1929 was 87% of capacity existing at the end of that year. Cement showed 34.2% of idleness and steel 13%.

Steel on the whole is a very thriving industry. Coal is the poorest of our large industries, but cement is not doing a great deal better, its production last year being under that of the two preceding years. Cement prices, moreover, have been declining markedly. The highest annual average price f.o.b. factory was $2.02 a barrel, in 1920. Nearly every year since has shown a decrease, and decreases have been continuous since 1925, last year's average being $1.48, 9 cents loss from 1928.

Details for 1929 were as follows: Capacity, 243,702,000 bbl. at beginning, 259,344,000 bbl. at end; production 170,646,036 bbl.; shipments, 169,868,322 bbl.; imports, 1,727,900 bbl.; exports, 885,321 bbl. From 1928 there was a decrease in imports and an increase in exports, so that it was not foreign competition that caused total production and shipments to decrease.

This is the second substantial backset cement has had, the other having occurred during the war. As to the growth, percentage increases up to 1902 were so large, with production so small, that the matter is of no particular interest. In 1902, production was approximately one-tenth of recent production. In three years it doubled, and in the next five years it more than doubled. Thereafter the course was quite irregular, but it fairly depicts the recent swings to say that from 1920 to 1928 there was an average annual increment of 7.3%, while from 1928 to 1929 there was 3.1% decrease.

Sand-Lime Brick Industry Suffers Less Than Clay Brick

AMERICAN PRODUCTION of sand-lime brick in 1929 was less in both quantity and value than in 1928, according to a statement on August 20 by the Bureau of the Census.

The statement, made public by the Department of Commerce, follows in full text:

The Bureau of the Census announces that according to a preliminary tabulation of the data collected in the Census of Manufactures taken in 1930, the total production of sand-lime brick in the United States in 1929 amounted to 277,397,000, valued at $3,006,246. These figures represent decreases of 11.5% and 17.7% respectively, as compared with 313,553,000, valued at $3,654,590, reported for 1928.

The statistics for 1929 are summarized in the following table, with comparative figures for 1928 and 1927. The figures for 1929 and 1927 were compiled from data collected at the biennial censuses of manufactures, and those for 1928 from the returns made at the annual census of production and stocks of sand-lime brick. The 1929 figures are preliminary, subject to revision.

(Percentage of increase, or decrease, is shown in Col. A for 1928-29; in Col. B for 1927-28.)

	1929	1928	1927	A	B
Number of establishments	42	41	45	(*)	(*)
†Wage earners (average for the year)	617	(‡)	790	....	–21.9
¶Wages	$818,525	(‡)	$1,051,495	....	–22.2
¶Cost of materials, fuel and purchased electric current	$980,281	(‡)	$1,157,965	....	–15.3
¶Products, total value	$3,104,332	$3,702,200	$3,616,456	–16.1	–14.2
Sand-lime brick:					
Thousands	277,397	313,553	§311,336	–11.5	(‖)
Value	$3,006,246	$3,654,590	§$3,542,906	–17.7	(‖)
Other products, value	$98,086	$47,610	$73,550	106.0	33.4
**Value added to manufacture:					
Total	$2,124,051	(‡)	$2,458,491	....	–13.6
Per wage earner	$3,443	(‡)	$3,112	....	10.6
Ratio (%) of cost of materials, etc., to value of products	31.6	(‡)	32.0	....	....
Stocks of sand-lime brick on hand December 31, thousands	23,452	21,018	§24,592	11.6	–4.6

*Per cent not computed where base is less than 100.

†Not including salaried employes. The average number of wage earners is based on the numbers reported for the several months of the year. This average somewhat exceeds the number that would have been required for the work performed if all had been continuously employed throughout the year, because of the fact that manufacturers report the numbers employed on or about the 15th day of each month, as shown by the payrolls, usually taking no account of the possibility that some or all of the wage earners may have been on part time or for some other reason may not actually have worked the entire week. Thus in some cases the number reported for a given month exceeds the average of that month.

‡No data.

¶Manufacturers' profits cannot be calculated from the census figures because no data are collected for certain expense items such as interest on investment, rent, depreciation, taxes, insurance and advertising.

§In addition, 8,282,000 of sand-lime brick, valued at $102,936, were manufactured in 1927 as a secondary product by establishments engaged primarily in other lines of manufacture, making a total production of 319,618,000, valued at $3,645,842. Stocks reported by these establishments outside the industry amounted to 483,000, making a total for stocks of 25,075,000. The statistics for 1928 and 1929 comprise data for all manufactures of sand-lime brick.

‖Not strictly comparable; see footnote §.

**Value of products less cost of materials, fuel and purchased electric current.

J. W. Brannan

J. W. BRANNAN, 61 years old, president of the Brannan Sand and Gravel Co., Denver, Colo., and a resident of Colorado nearly forty years, died Wednesday, August 6, following an attack of acute gastritis.

In good health until the sudden attack Monday, and believed to be on the road to recovery Tuesday, Mr. Brannan's condition grew worse Wednesday, and he was removed to the hospital.

Born in Bryan, Ohio, May 20, 1869, he received his early education in that city, and came to Colorado in 1891. In 1896 he married Miss Laura Stewart of Denver.

A pioneer in the sand and gravel business here, Mr. Brannan had built his firm to one of the largest of its kind in the West. His first important project was the establishment of a coal and grain business, but he later transferred his activities to contracting and excavating.

The present firm name was given to the old Denver Sand and Gravel Co. which he operated in 1899. As president and general manager of the organization, he had been in active control, with his son, Lloyd S. Brannan, secretary, and his son-in-law, Frank P. Spratlen, Jr., vice-president and treasurer of the company.

Mr. Brannan was widely known in business and civic circles. He was a member of El Jebel Temple, Colorado Consistory No. 1 and the Commandery. He also belonged to the Rotary Club, Denver Athletic club and Wellshire Country club. He was an active church worker, and one of the board of trustees of Central Presbyterian church.

He is survived by his widow and son, Lloyd; a daughter, Mrs. Frank P. Spratlen, Jr.; two sisters, Mrs. James Castetter, Denver, and Mrs. John W. Morgan, Pocatello, Idaho, and two grandsons, Frank P. Spratlen III and J. W. B. Spratlen.—*Denver* (Colo.) *Journal.*

New Quarry to Be Opened in Iowa

FRED L. BELZER has plans well under way to open a stone quarry in Floyd county this fall near the Illinois Central station in Floyd, Iowa, on land owned by D. Wilbur. The quarrying will be done on a royalty basis.

Electric power is to be used and the Charles City plant will extend lines to the quarry. A force of eight or ten men will be employed.—*Charles City* (Ia.) *Press.*

Tulsa Aggregate Producer to Make Concrete Pipe

FORMAL OPENING of the new plant of the Oklahoma Cement Pipe Co. on Thirteenth street and the Frisco tracks adjoining Crowell Heights addition, Tulsa, Okla., was featured by a buffet luncheon at which were present Chamber of Commerce directors, city and county officials and a number of business friends of the institution.

Officers of the company are J. M. Chandler, president and general manager; T. R. Dean, vice-president, and Claude W. Chandler, secretary and treasurer. Affiliated companies under the same management and ownership are the Hughes Stone Co. and the Price Sand Co.

The main building is 60 ft. wide by 200 ft. long with all steel construction. It has a continuous concrete foundation with full reinforced floor and, additionally, has a deck 25 by 60 ft. also built of reinforced concrete on which cement is stored. An electric hoist is used for unloading and storing cement.

An 800-ton octagon steel storage bin adjoins the building. It has five compartments for storing stone and sand and a separate underslung cement compartment. Each of the compartments discharges through a gate by gravity into a common weighing batcher. When the exact amount of each material required has been placed in the weighing batcher, the "batch" is discharged through another gate on to a conveyor which extends from under the batcher into a large concrete mixer inside the building which serves the pipe machine. Water supply is measured.

This conveyor is on a track and can be shifted from underneath the weighing batcher very quickly so as to accommodate the loading of trucks without a moment's delay, should trucks be waiting for material.

After the pipe has been made on the machine it is removed in steel carts out on to the warehouse floor, where it is cured by a system of water sprays which play on it as long as the pipe absorbs water. The pipe remains in the building an average of five days before being rolled out to the storage yard, which consists of seven acres of ground adjoining the plant.

The machine used for the manufacture of this pipe is what is known as the Quinn "Heavy Duty" K type machine. The semi-dry process is used. Both reinforced and plain non-reinforced pipe is made. The concrete used in the pipe is conveyed from the large mixer to the pipe machine and as it runs into the molds a powerful trip hammer tamping device rams it into a hard dense mass, subjecting every particle to a terrific pressure. This method produces concrete pipe that meets the most rigid specifications.

The Hughes Stone Co. and Price Sand Co., affiliated concerns, supply the stone and sand requirements for the pipe company, and maintain through the use of that company's storage bins, a retail yard.—*Tulsa* (Okla.) *World.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

St. Paul Aggregate Producer Markets Bulk of Production as Concrete

J. L. Shiely Co., Through Ready-Mix Subsidiary, Sells Sand, Gravel and Crushed Stone

HONEST, RELIABLE CONCRETE can be turned out with any degree of certainty only where the plant has been built to give full and easy control over the operations of proportioning and mixing, and of course where high grade materials are used, and where the weighing or proportioning is done accurately and checked by frequent testing of both the materials and the concrete. This is of vital importance to the future of central mixing plants. Improperly built plants with poor and uncertain methods of control will hurt contractors, or users, and other central mixing plants, as well as the owners of such plants in the end, by lessening public confidence in the method; so quality production must constantly be aimed at, just as in every other line of successful industry today.

At St. Paul, Minn., the J. L. Shiely Co. interests, under the name of the Guaranteed Concrete Co., are now operating two concrete mixing plants which may be taken as good examples of properly designed and built plants with well organized control. As the name indicates, they guarantee to deliver concrete of not less than the desired strength, which after all is the thing aimed at by the various specifications calling for certain mixes. Where a definite mix is called for, they guarantee corresponding strengths; as for instance 1500 lb. per sq. in. in 28 days for a 1:3:5 mix; 2000 lb. for a 1:2:4 mix; and 2500 lb. for a 1:2:3½ mix; but would be glad to see specifications changed so that concrete would be sold entirely on a strength basis, for then they could use their own expert knowledge of correct proportioning.

The Guaranteed Concrete Co. is operated independently, but of course purchases its concrete materials from the J. L. Shiely Co., one of the advantages of this arrangement being the better control over the quality of

Plant No. 1 of the J. L. Shiely Co., St. Paul, Minn., operating under the name of the Guaranteed Concrete Co. More trucks have been added to this fleet since the picture was taken

GUARANTEED CONCRETE CO., INC.—PRICE LIST EFFECTIVE FEBRUARY 1, 1930, ON ORDERS LESS THAN 100 YD. (PER CUBIC YARD)

Zn.	28 Days 2000-lb. 1-2-4	1500-lb. 1-3-5	2500-lb. 1-2-3½	1-3-6	1-2-3	1-2½-5	1-2½-4½	1-5-8	1-1	1-2	1-1½	1-2½	1-3	1-3½	1-4
1	$8.10	$7.35	$8.25	$7.15	$8.40	$7.70	$7.60	$7.50	$14.00	$10.75	$12.15	$ 9.80	$9.20	$8.60	$8.15
2	8.00	7.25	8.15	7.05	8.30	7.70	7.50	6.40	13.90	10.65	12.05	9.70	9.10	8.50	8.05
3	8.35	7.60	8.50	7.40	8.65	7.75	7.85	6.75	14.25	11.00	12.40	10.05	9.45	8.85	8.40
4	8.50	7.75	8.65	7.55	8.80	7.90	8.00	6.90	14.40	11.15	12.55	10.20	9.60	9.00	8.55
5	8.60	7.85	8.75	7.65	8.90	8.00	8.10	7.00	14.50	11.25	12.65	10.30	9.70	9.20	8.65
6	8.20	7.45	8.35	7.25	8.50	7.60	7.70	6.60	14.10	10.75	12.25	9.90	9.30	8.80	8.25
7	9.05	8.30	9.20	8.10	9.35	8.45	8.55	7.55	14.95	11.70	13.10	10.75	10.15	9.65	9.10
8	8.55	7.80	8.70	7.60	8.85	7.95	8.05	6.95	14.45	11.20	12.60	10.25	9.65	9.15	8.60
9	8.70	7.95	8.85	7.75	9.00	8.10	8.20	7.10	14.60	11.35	12.75	10.40	9.80	9.30	8.75

¾-in. Gravel—25c per yard less. Heating—40c per yard extra.
Discount for cash or payment by tenth of month following delivery—5%.
Prices on mixes other than above on application.

GUARANTEED CONCRETE CO., INC.—PRICE LIST EFFECTIVE FEBRUARY 1, 1930 (PER CUBIC YARD)

Zn.	1-2-4	1-3-5	1-2-3½	1-3-6	1-2-3	1-2½-5	1-2½-4½	1-5-8	1-1	1-2	1-1½	1-2½	1-3	1-3½	1-4
1	$7.60	$6.85	$7.75	$6.65	$7.90	$7.00	$7.10	$6.00	$13.50	$10.25	$11.65	$ 9.30	$8.70	$8.10	$7.65
2	7.50	6.75	7.65	6.55	7.80	6.90	7.00	5.90	13.40	10.15	11.55	9.20	8.60	8.00	7.55
3	7.85	7.10	8.00	6.90	8.15	7.25	7.35	6.25	13.75	10.50	11.90	9.55	8.95	8.35	7.90
4	8.00	7.25	8.15	7.05	8.30	7.40	7.50	6.40	13.90	10.65	12.05	9.70	9.10	8.50	8.05
5	8.10	7.35	8.25	7.15	8.40	7.50	7.60	6.50	14.00	10.75	12.15	9.80	9.20	8.70	8.15
6	7.70	6.95	7.85	6.75	8.00	7.10	7.20	6.10	13.60	10.25	11.75	9.40	8.80	8.30	7.75
7	8.55	7.80	8.70	7.60	8.85	7.95	8.05	7.05	14.45	11.20	12.60	10.25	9.65	9.15	8.60
8	8.05	7.30	8.20	7.10	8.35	7.45	7.55	6.45	13.95	10.70	12.10	9.75	9.15	8.65	8.10
9	8.20	7.45	8.35	7.25	8.50	7.60	7.70	6.60	14.10	10.85	12.25	9.90	9.30	8.80	8.25

Orders under 100 yards—50c per yard extra. ¾-in. Gravel—25c per yard less.
Heating—40c per yard extra.
Discount for cash or payment by tenth of month following delivery—5%.
Prices on mixes other than above on application.

the materials when produced within the same organization.

Two Plants—One Uses Gravel; Other, Crushed Stone

The first, or No. 1, plant was built adjoining the J. L. Shiely Co. sand and gravel plant on Snelling Ave., in the northwestern section of St. Paul, about 5 miles from the downtown district, and has been in operation since June 1929.

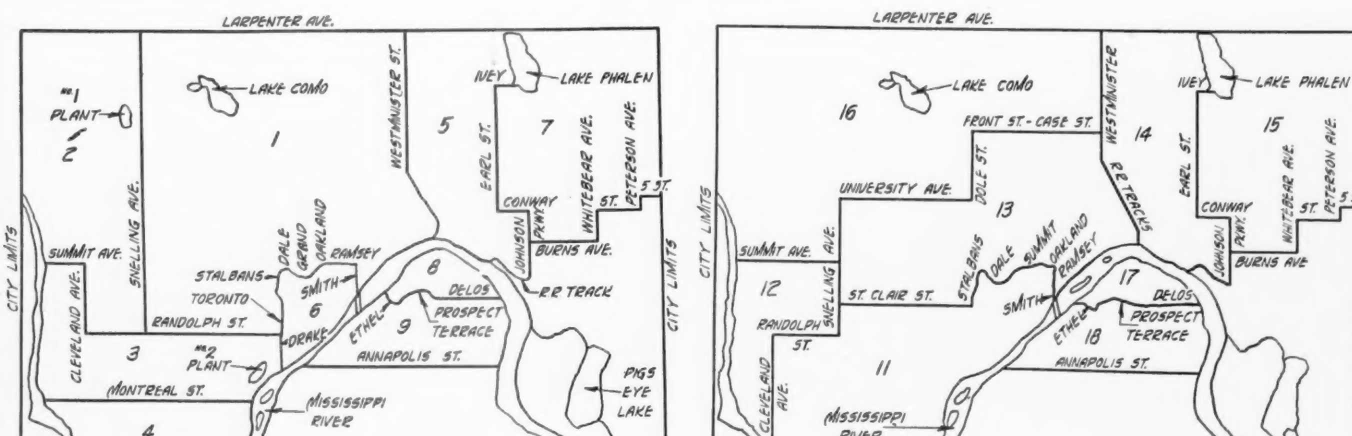
The new No. 2 plant, which has just been completed and was put into operation early in August, adjoins the J. L. Shiely Co. crushed-stone plant, which is located between West Seventh Ave. and the Mississippi River in the southwestern section about 3 miles from the downtown district. At the No. 1 plant sand and gravel are used as aggregates, and are hauled by trucks from the adjacent sand and gravel plant, while at the No. 2 plant crushed stone, brought on belt conveyors from the adjacent plant, is used as coarse aggregate, along with sand trucked from the Snelling Ave. sand and gravel plant. In this way the excess of sand at the gravel plant is utilized.

J. L. SHIELY CO., INC.—PRICE LIST OF SAND, GRAVEL AND STONE, EFFECTIVE FEBRUARY 1, 1930 (PER CUBIC YARD)

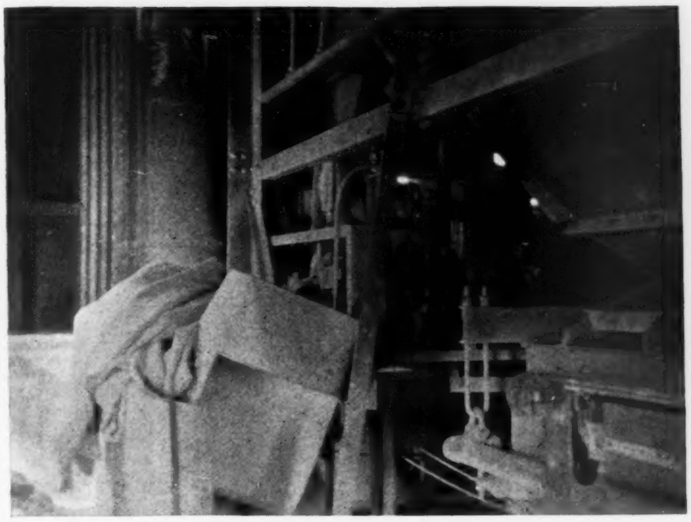
		Gravel							Crushed Rock			
Zone	Sand	¼- to ¾-in.	¼- to 1-in.	¼- to 2-in.	1-1 Mix	1-2 Mix	Roofing Gravel	Zone	2-in. and Down	1-in. and Down	Screenings Coarse	Screenings Fine
1	$1.60	$2.50	$2.85	$2.75	$1.85	$2.10	$3.25	11	$2.50	$2.60	$1.60	$1.50
2	1.50	2.40	2.75	2.65	1.75	2.00	3.15	12	2.60	2.70	1.70	1.60
3	1.75	2.65	3.00	2.90	2.00	2.25	3.25	13	2.60	2.70	1.70	1.60
4	1.85	2.75	3.10	3.00	2.10	2.35	3.35	14	2.85	2.95	1.95	1.85
5	1.85	2.75	3.10	3.00	2.10	2.35	3.50	15	3.05	3.15	2.15	2.05
6	1.70	2.60	2.95	2.85	1.95	2.20	3.35	16	2.75	2.85	1.85	1.75
7	2.05	2.95	3.30	3.20	2.30	2.55	3.75	17	2.70	2.80	1.80	1.70
8	1.70	2.60	2.95	2.85	1.95	2.20	3.35	18	2.80	2.90	1.90	1.80
9	1.80	2.70	3.05	2.95	2.05	2.30	3.45	....	....	....	....	....

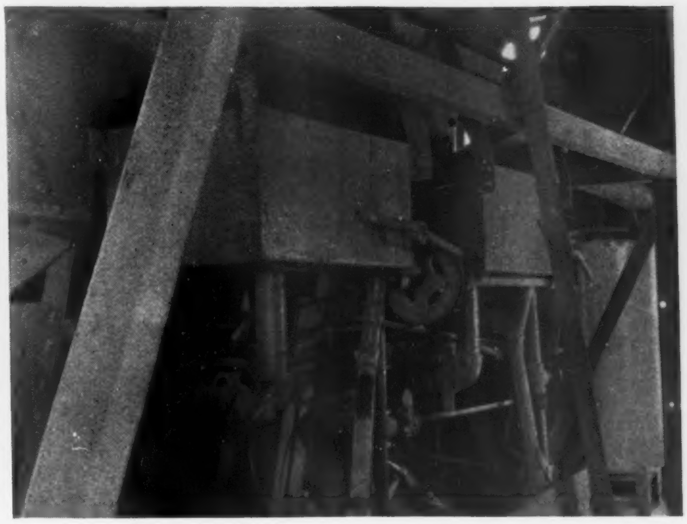
5% Discount for cash or payment by tenth of month following delivery.

Because of the variation in moisture content of the sand which was to be used in the No. 1 concrete-mixing plant, it was decided to install the inundator system when that plant was built. The reason for this was that at that time, on account of limited storage and drainage space, the moisture in



Delivery system is governed by zones. The zone map for ready-mixed concrete is shown at the left. The other controls truck deliveries of crushed stone





Rear view of beam scale on batchers in concrete plant No. 1 and, at right, two inundator tanks with inundators beyond

the sand varied all the way from 4% up to 17%. However, this condition has been largely overcome, particularly as to the sand going to the new plant, which now has a moisture variation of only between 4% and 5%, so that the straight weighing system was decided on for the No. 2 plant, using dry stone aggregates and the practically uniform sand.

Thus the company is operating one plant of each type on different materials, both making equally good concrete, the weighing type of plant, however, being a little easier to operate

Each plant is equipped with a 3-yd. Ransome mixer, and has a maximum capacity of 600 cu. yd. of concrete per 10-hour day. No. 1 plant has Blaw-Knox bins and weighing hoppers, and No. 2 plant is equipped with bins and weighing hoppers furnished by the C. S. Johnson Co.

Before building these plants, practically every concrete-mixing plant of any importance in the country was visited and studied by the officials of the company, attention being paid both to the matter of mixing and that of hauling, and as a result they chose certain methods as best meeting their requirements. Tolz, King and Day, architects and engineers, were employed by the Shiely company to act as consultants and to work out the special engineering features necessary for complete and efficient plants.

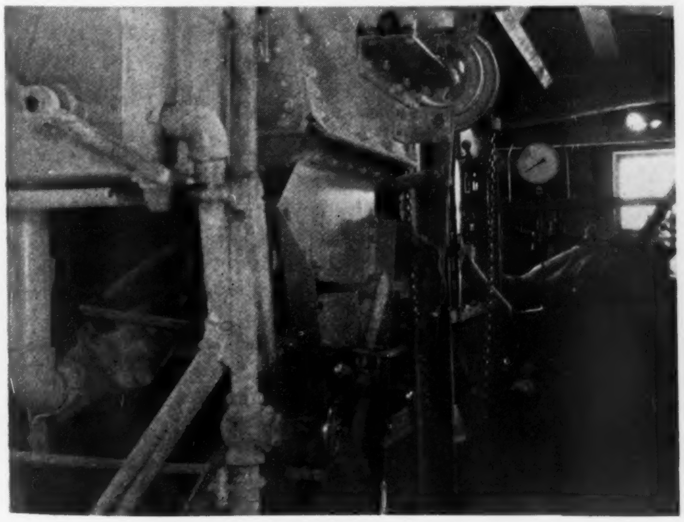
In order to control and check the quality of the concrete turned out, frequent tests are carried on daily. The moisture content in the sand is determined several times a day by drying a sample on an electric heating plate and weighing, and a proper correction made on the amount of water used.

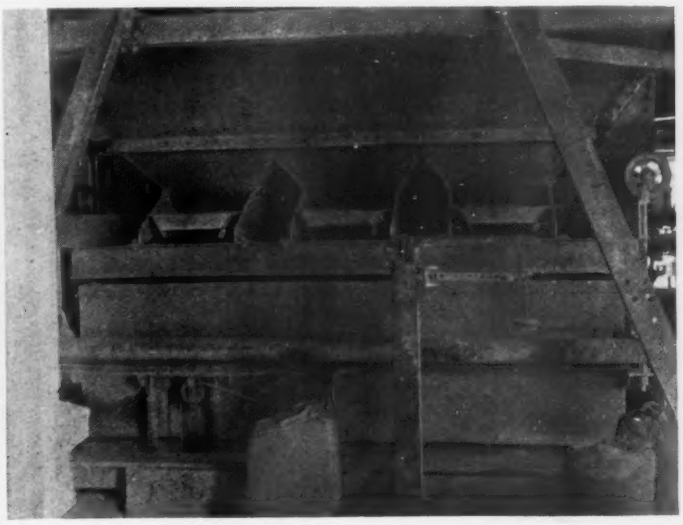
Slump tests are made several times daily and 6-in. test cylinders poured. These test cylinders, as well as all cement shipments received, are tested by the Quincy A. Hall Laboratories and permanent records of all tests are kept.

No. 1 Concrete Mixing Plant

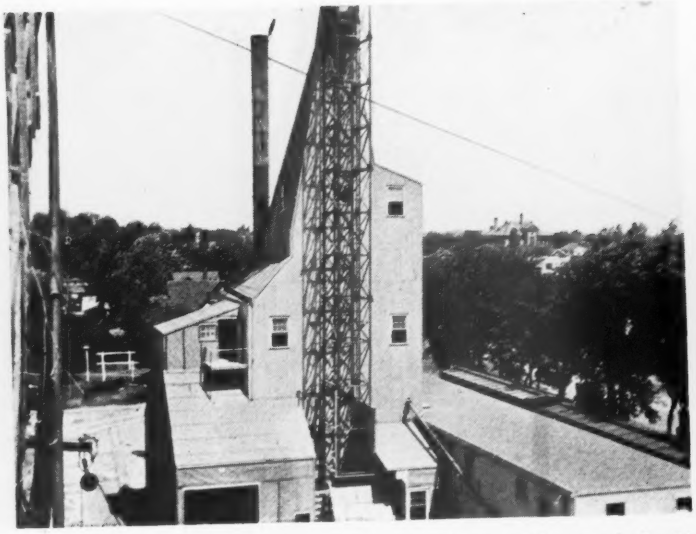
At this plant, the aggregate materials are trucked from the adjoining sand and gravel plant, dumped into a steel hopper, and elevated to overhead bins by a skip hoist. The rest of the handling is by gravity down through the weighing hoppers and mixer to the trucks.

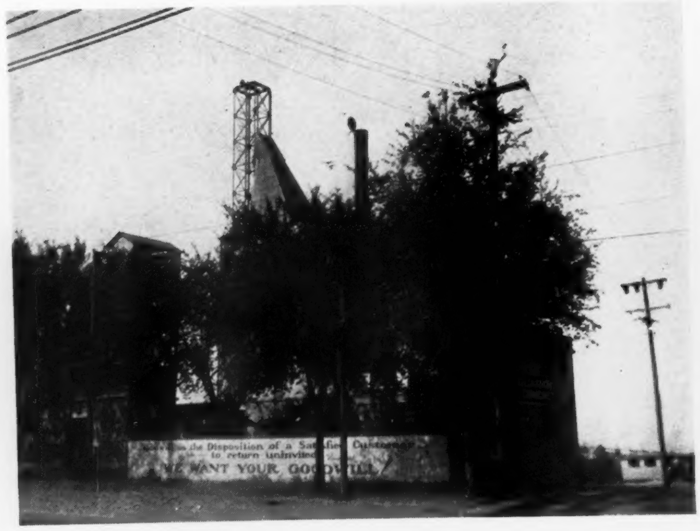
Sand and three sizes of gravel, one at a time, are dumped into a steel, receiving hopper located at ground level on one side of the plant; and from this hopper each of the four aggregates is elevated by a 1-yd. Insley skip bucket operated by an American single-drum hoist. The hoist is driven by a 60-hp. General Electric, slip-ring motor through a Link-Belt silent chain, and is arranged with a drum controller and friction and brake levers. Within reach also of the hoist operator is a lever which operates a gate between the receiving hopper and a measuring hopper below, holding one skip load. An arm attached to a gate on the bottom of the measuring hopper is so arranged that the skip bucket opens this gate and is filled when it comes to the bottom, and automatically closes it again when the skip starts up, allowing the operator with his lever to refill the measuring hopper while the skip is up. At the top the skip bucket automatically discharges to a hopper and spouts leading to four bin compartments above the weighing hoppers.



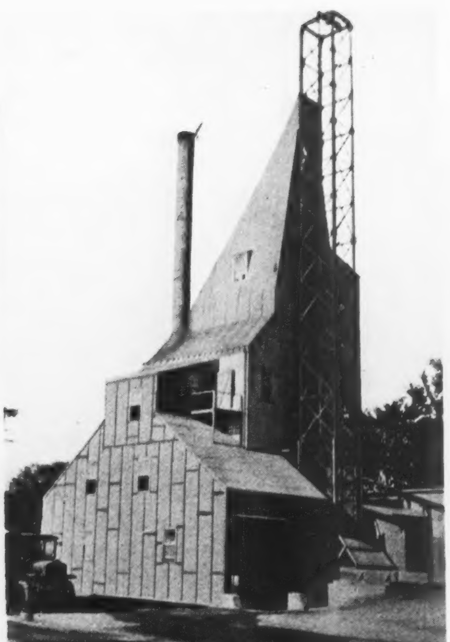


Views along the operating floor at concrete plant No. 1, showing, left, batchers with scale beams in the background and one of the inundator tanks in the foreground. At right, weighing hopper under gravel bins



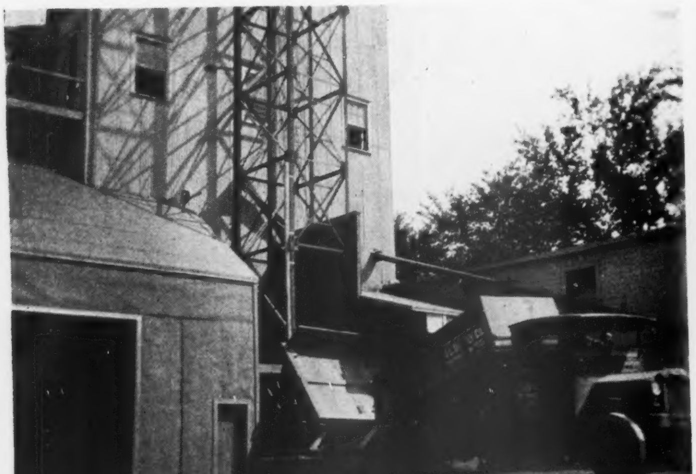


Two pictures of the No. 1 Shiely concrete plant



Skip hoist for elevating material and runway for trucks

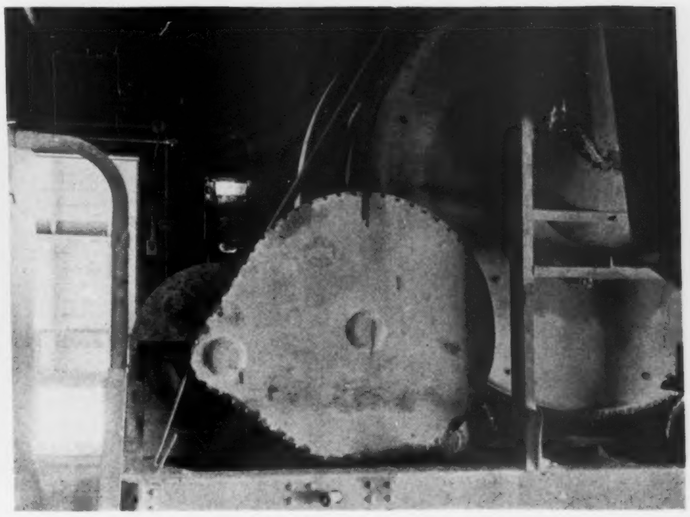
Delivery truck with agitator body being loaded



Sand and gravel are elevated to the bins by the skip hoist from receiving hopper fed by trucks at No. 1 plant

Guaranteed Concrete Co. truck delivering ready-mixed to the all-concrete Northern States building

Gravel hopper at left and sand weighing hopper at right in concrete plant No. 1



3-yd. mixer and drive. Batch meter is shown in rear just above the motor

Three compartments are used for gravel sizes (2-in., 1-in., and ¾-in., or pea gravel) and one compartment for sand, with a total capacity in all compartments of about 130 cu. yd. Gates in these spouts are arranged with wire-rope connections leading down to the hoisting floor so that the hoist operator may put each size into its proper bin.

Cement is received at the plant either in sacks or in bulk in box cars on the railroad siding back of the plant and is moved on hand trucks when in sacks, or in two-wheeled buggies when in bulk, to the boot of a steel encased bucket elevator, which carries it up to a small steel bin over the cement weighing hopper. This bin has a capacity of about 6500 lb. of cement and is arranged with an automatic device, furnished by the Fuller Co., for controlling the operation of the elevator and the filling of the bin. The control device consists of a paddle arrangement with a mercury bulb contactor hung inside of the bin in such a way that when the bin is partly emptied, contact is made and the motor driving the elevator is automatically started, and when the bin is almost filled, the contact is broken and the elevator is stopped. Thus the elevator is started and stopped automatically, depending upon the amount of cement in the bin, and the feeding of cement to the elevator boot is carried on only when it is running. Two to three men are required for the handling of cement, and several carloads of cement in sacks are kept in the warehouse as : reserve stock. The bins, weighing hoppers and scales were furnished by the Blaw-Knox Co.

Inasmuch as it is somewhat cheaper to handle, bulk cement is used, as far as possible or practicable.

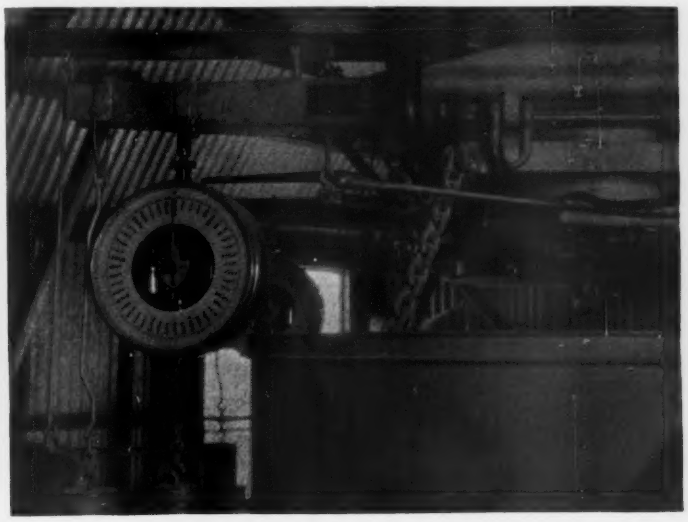
The three gravel sizes are weighed in a weighing hopper with three scale beams, while the sand is handled in one or both of two tilting type inundator buckets in connection with another weighing hopper, depending upon the size of the batch being mixed. As used at present, one inundator has a capacity of 1100 lb. of sand for a 1-yd. batch, and the other a capacity of 1650 lb. for a 1½-yd. batch, and any additional sand necessary for the batch is weighed. Thus, for example, in mixing a 3-yd. batch of a certain mix which may require approximately 1400 lb. of cement, 3600 lb. of sand and 6400 lb. of gravel, the additional 850 lb. of sand required over the capacity of the inundators is weighed. The inundators, while carrying a definite quantity of sand, also carry a definite quantity of water (59 gal. for both), which is taken account of and the necessary additional water added from a tank on the weighing floor, equipped with a gage and valve. The cement is weighed in another similar weighing hopper.

The weighing hoppers are all arranged with Fairbanks beam scales having indicating dials to more easily read their balancing points.

The weights on the beams are, of course, set for the proper quantities required for any given batch, which has been worked out in tabular form, so that by referring to the tables any batch from ½-cu. yd. to 3-cu. yd., and of any proportions, may be weighed.

After being weighed, the materials are

On the weighing floor. Drum controller for mixer in foreground and telautograph directly behind it



Here is a close-up view of the weighing hopper and shows hook-up of springless dial scale, No. 2 plant

John P. Lynch, truck dispatcher, at left, and P. M. Clark, in charge of concrete Plant No. 1, in dispatcher's office. The telautograph is used for accurate and fast transmission of orders to the weighman in the plant

One of the trucks used in delivering concrete to various jobs in and around St. Paul. The Guaranteed Concrete plant supplies material for about 90% of the big building operations being pushed in the Twin Cities

tripped into a steel hopper below, from which they flow into the mixer and the additional water is added.

The 3-yd. Ransome mixer is driven by a 60-hp. General Electric, slip-ring motor, whose drum controller is located on the weighing floor above, within reach of the operator.

A "Batch meter" connected with the dumping lever is used to insure complete mixing and to prevent dumping the batch too soon. It automatically locks the dumping lever when the last of the aggregates has been discharged into the mixer and unlocks it and rings a bell when two minutes have elapsed. A red signal lamp located alongside the scales on the weighing floor is also connected with the dumping lever in such a way that it lights during the time the batch is being dumped, and goes out when the mixer has been emptied and the dumping lever restored, thus indicating to the weighing operator when he may proceed with the next charge.

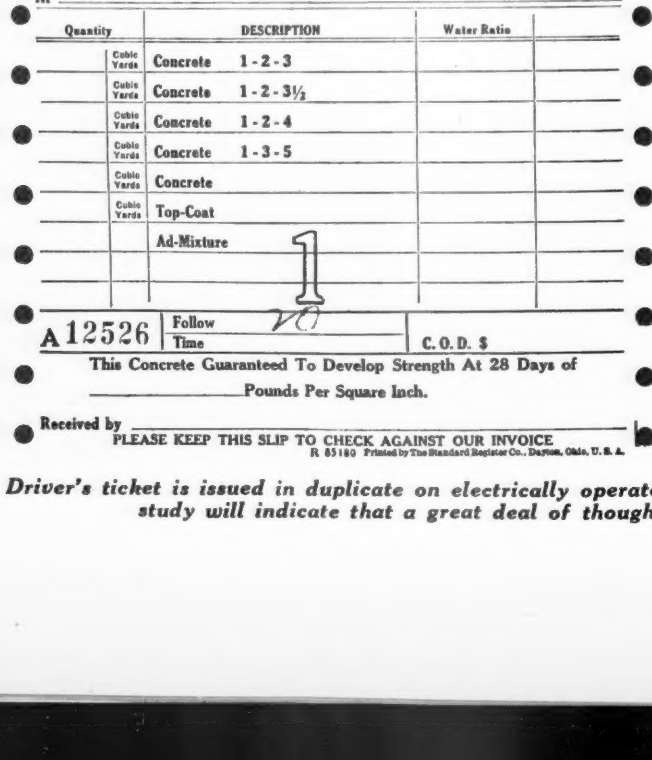
In this way the mixing plant is operated with 6 to 7 men and is able to turn out a maximum of 60 cu. yd. per hour.

Automatic Transmission of Orders a Feature

The orders as received at the plant office are noted on a large sheet and full information put down, including time when delivery is wanted. Then when due, the dispatcher gives the order to the weighman in the plant by means of the Telautograph; and also makes out the driver's ticket and delivers it to him.

The Telautograph, made by the Telautograph Co., New York City, and used in railway stations, hotels, banks and elsewhere for quick written communication between departments, consists in this case of a machine at the weighman's position in the plant, and is a system of transmitting a written message electrically and instantaneously.

The dispatcher writes his order with a stylus on a metal plate, and his message as



CUSTOMER'S COPY

GUARANTEED CONCRETE CO.

READY-MIXED CONCRETE

Plant and Office At SNELLING AVE. AND WYNNE ST. ST. PAUL, MINNESOTA

PHONE MIDWAY 8808

Truck No.______ Zone ______ Date ______________ 19 ___

Delivered to ______________________

At ______________________

Quantity		DESCRIPTION	Water Ratio	
	Cubic Yards	Concrete 1-2-3		
	Cubic Yards	Concrete 1-2-3½		
	Cubic Yards	Concrete 1-2-4		
	Cubic Yards	Concrete 1-3-5		
	Cubic Yards	Concrete		
	Cubic Yards	Top-Coat		
		Ad-Mixture 1		

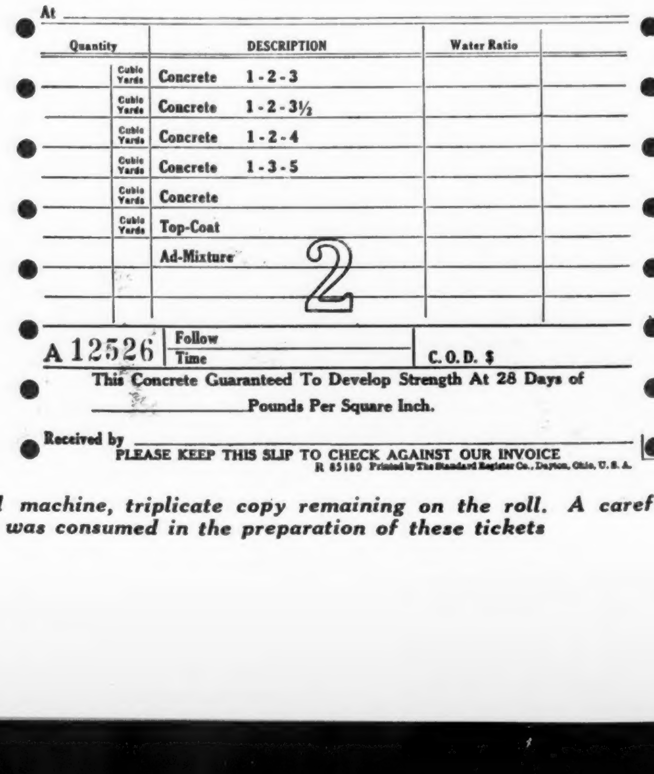
A 12526 Follow Time ______ C. O. D. $

This Concrete Guaranteed To Develop Strength At 28 Days of ______ Pounds Per Square Inch.

Received by ______________________

PLEASE KEEP THIS SLIP TO CHECK AGAINST OUR INVOICE

R 85180 Printed by The Standard Register Co., Dayton, Ohio, U. S. A.



SIGN AND RETURN

GUARANTEED CONCRETE CO.

READY-MIXED CONCRETE

Plant and Office At SNELLING AVE. AND WYNNE ST. ST. PAUL, MINNESOTA

PHONE MIDWAY 8808

Truck No.______ Zone ______ Date ______________ 19 ___

Delivered to ______________________

At ______________________

Quantity		DESCRIPTION	Water Ratio	
	Cubic Yards	Concrete 1-2-3		
	Cubic Yards	Concrete 1-2-3½		
	Cubic Yards	Concrete 1-2-4		
	Cubic Yards	Concrete 1-3-5		
	Cubic Yards	Concrete		
	Cubic Yards	Top-Coat		
		Ad-Mixture 2		

A 12526 Follow Time ______ C. O. D. $

This Concrete Guaranteed To Develop Strength At 28 Days of ______ Pounds Per Square Inch.

Received by ______________________

PLEASE KEEP THIS SLIP TO CHECK AGAINST OUR INVOICE

R 85180 Printed by The Standard Register Co., Dayton, Ohio, U. S. A.

Driver's ticket is issued in duplicate on electrically operated machine, triplicate copy remaining on the roll. A careful study will indicate that a great deal of thought was consumed in the preparation of these tickets

GUARANTEED CONCRETE CO.—Daily Report

________________ 19__

GUARANTEED CONCRETE COMPANY CEMENT AND ADMIXTURE INVENTORY

Name of Cement													
On Hand													
Received Today Car No.													
Car No.													
Car No.													
Total													
Used Today													
Balance on Hand													

MATERIALS USED

MIX	Cu. Yds. Concrete Produced	Sacks Cement	Cubic Yards Sand	Cubic Yards ¾ in. Gravel	Cubic Yards 1 in. Gravel	Cubic Yards 2 in. Gravel	ADMIXTURES		
1–2–4									
1–3–5									
1–2–3½									
1–3–6									
1–2–3									
Total									

Not Sold		Account	METER READING Light ____ Power ____ Water
Net Sales			

Empty Sacks Returned Today		Ticket No.	Loads Returned Today Account	
To				Operated Hours—From To
To				Delayed Hours—From To
To				Reason—

Remarks

Report Truck delays in Remarks and if chargeable to Customer or not.
Report Customers Cement Furnished and Used on Back.

Plant. Engineer

CUSTOMERS CEMENT INVENTORY

Name of Cement								Empty Sacks Returned to	Number Sacks
On Hand									
Received Today Car No									
Total									
Used Today									
Balance on Hand									

CUSTOMERS CEMENT INVENTORY

Name of Cement								Empty Sacks Returned to	Number Sacks
On Hand									
Received Today Car No									
Total									
Used Today									
Balance on Hand									

CUSTOMERS CEMENT INVENTORY

Name of Cement								Empty Sacks Returned to	Number Sacks
On Hand									
Received Today Car No									
Total									
Used Today									
Balance on Hand									

Form used by the ready-mixed plant, ledger sheet, 11 in. by 17 in., front and back

GUARANTEED CONCRETE PLANT No. 1

Truck Number	.ame						Date			
	Address									
ZONE										
Ticket Number	Yards	Yards	Yards	Yards	Yards	Yards	Yards	Yards	Yards	Yards
TOTAL										

Individual truck delivery reports are required, original size, 5 in. by 8 in., printed on cardboard stock

written appears in ink on a paper roll in front of him and, at the same time, in front of the weighman at the other station. After writing, the dispatcher presses a button which rings a bell at the other station, insuring the weighman's attention. He, in turn, with his stylus checkmarks the order, which check shows on both machines. The written order gives simply in a row of figures, the size of the required batch in cubic yards, the proportions to be used, and the truck number which is to get the batch. In this way a definite record is kept, and any errors or misunderstandings liable to happen over a telephone are avoided.

Delivery Records

The driver's ticket is, at the same time, made out on a register furnished by the Standard Register Co. of Dayton, Ohio. This machine is similar to those in general use except that it is electrically operated, each set of tickets being wound off by simply pressing a lever. The tickets are in triplicate, one remaining on the roll as a permanent record, and the other two going to the driver. Of these two, one is delivered by the driver to the purchaser for his record, and the other is signed by the purchaser and returned to the office by the driver. The ticket shows the date, what job and where located, cubic yards, kind of mix, truck number carrying it, zone number to which it goes, and the number of the truck which it follows. The last is for the information of the truck driver and the man loading the truck, so that there may be no mistake about loading the proper truck. The drivers' room is below the dispatcher's office and the drivers' tickets are dropped down a chute to them. Upon his return from the previous trip, each driver reports at once to the dispatcher his return, and the trucks are sent out again in the order of their return. The drivers are paid on a straight time basis.

One of the features of this plant is the provision for heating of the materials and water so that it is a year round operation (and winters in St. Paul are *cold*). A steam boiler under the plant heats the materials in the bins by means of steam pipes running through them, so that the concrete is guaranteed to be at a temperature of 90 deg. F. when leaving the plant. The drop in temperature on the way to the job does not seem to be very great, as even in sub-zero weather the concrete arrives at the job at a temperature of from 70 to 75 deg. F. A number of winter pouring jobs have been successfully handled by thus heating the materials.

A. R. Shiely, vice-president in charge of production at Shiely concrete plants

Truck Deliveries of Concrete

It is generally considered necessary, or at least very desirable, where the concrete must be transported very far, to use agitator type bodies to prevent segregation and keep the concrete conditioned, and at these plants such bodies are used entirely except for certain short hauls.

The delivery fleet consists at the present time of 21 Clinton type agitator bodies of 3-cu. yd. capacity furnished by the Clinton Motors Corp., and 7 so-called "bath tub" or plain, open-dump bodies. The trucks are of various kinds including Mack, White, Pierce-Arrow, International, and are owned by trucking contractors or others than the concrete company. The bodies were provided by the concrete company, and the use of the trucks is paid for according to the amount of trucking done, on a mileage basis.

The Clinton bodies, which are smooth inside, are turned slowly through gear reductions by an 8-hp. two-cylinder LeRoy gasoline engine mounted just back of the driver's cab. The bodies are revolved only while carrying a load of concrete, the small gasoline engine being disconnected by a clutch at all other times.

All the trucks have St. Paul hydraulic dumping mechanisms for tilting the bodies.

For delivery purposes the city is divided into 58 zones or squares consecutively numbered. The location of the delivery point in one of these zones is the basis on which the trucks are paid, this being according to distance on a mileage basis.

The average running time of these trucks is about 8 min. to the mile, so that allowing 5 min. for dumping and 5 min. at the loading end, one truck makes a round trip from the No. 1 plant to the downtown section in about 1½ hr., or a round trip from the No. 2 plant in about an hour.

No. 2 Concrete Mixing Plant

At this plant, which was put into operation early in August of this year, and is about the last word in mixing plants, the same general scheme is used, with a number of improvements as to details.

The aggregates are carried up to overhead bins on an inclined belt conveyor, and the cement in an enclosed bucket elevator, both ingredients being drawn down by gravity through the weighing hoppers and mixer to the trucks. The plant has been built in a thoroughly substantial manner and the operation made as nearly automatic as possible, along with accurate control.

The sand is trucked from the other plant and is dumped from a ramp into a hopper from which it is fed to the main conveyor on a slow moving 30-in. by 60-ft. belt conveyor driven by a 7½-hp., General Electric motor through Link-Belt silent-chain drive.

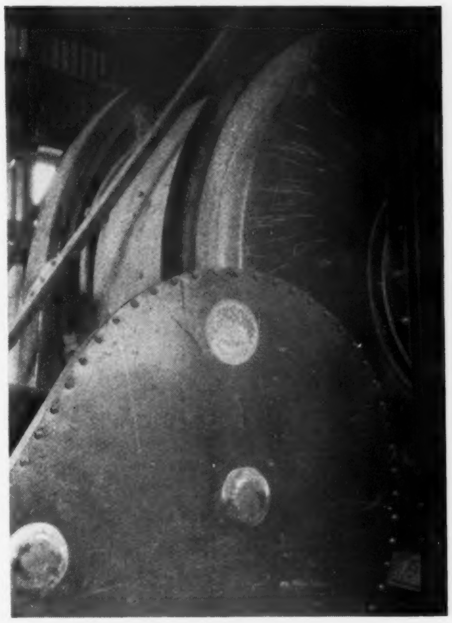
The main belt conveyor, which carries both crushed stone and sand, one size at a time, is 24 in. wide by 220 ft. long and is driven at the top through a Link-Belt, silent-

chain drive by a 40-hp. General Electric, slip-ring motor with drum controller.

The Link-Belt conveying equipment has Timken roller-bearing carriers. The material discharges from the conveyor into a four compartment steel bin, three compartments for stone sizes and one for sand, each with a capacity of about 40 cu. yd. A turnhead is used to direct the material into its proper compartment.

The bins and weighing hoppers were furnished by C. S. Johnson Co., the weighing equipment consisting of five circular hoppers with conical bottoms, one for cement, one for sand, and three for stone sizes, hung on lever arms connected with springless type dial scales where the weights are read direct without the use of scale beams. The cement hopper has a capacity of 30 cu. ft. and the four aggregate hoppers each have a capacity of 90 cu. ft. One advantage of this arrangement is that all the dials may be seen and read from the same position and without the necessity of going from one to another.

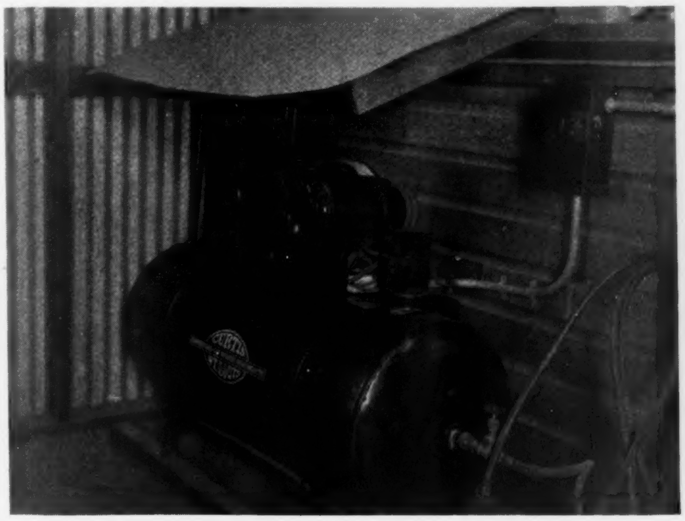
Cement is brought in on a railroad siding at the back of the plant, normally in bulk but with some in sacks to maintain an additional reserve supply in the warehouse. The bulk cement is unloaded by a Link-Belt power shovel directly from the car into the elevator boot alongside the track. This steel encased bucket elevator discharges through a two-way spout into either half of an overhead, dust-tight, steel cement bin with a center partition. Each half of this bin holds about one carload of cement.



Partial view of 3-yd. mixer in No. 2 plant and driver. Its position made photographing difficult

Automatic Control of Elevator a Feature

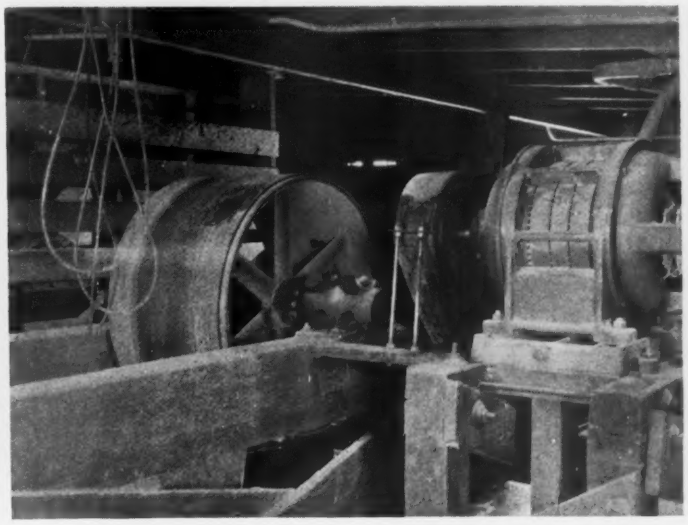
Each side of the bins is arranged with an automatic device, furnished by the Fuller Co. for controlling the operation of the elevator and the filling of the bins. It consists of a paddle arrangement hung inside the bin in such a way that when the bin is drawn down to about the one-third point, contact is made in a mercury bulb attached to the paddle and the elevator motor started, and when the bin is almost filled, the contact is broken and the elevator is stopped. A switch is also connected up mechanically with the gate in the two-way spout, so that this gate



Compressor, No. 2 plant, supplies air for agitating cement in bins so that it flows freely

Water tank which is equipped with valves for accurate weighing of water for mixer

Four aggregate hoppers in plant No. 2 showing cement hopper beyond



Head end and drive for elevator belt conveying sand and stone to the bins

Looking toward the stone plant

must be turned into the other bin before the contact device becomes operative on that bin. In this way the loading of cement bins is practically automatic and a proper supply of cement without overfilling of the bins is assured.

Compressed air furnished by a small, electrically-driven Curtis air compressor unit located on the mixer floor is piped to the bottom of the cement bin and is used as may be necessary to agitate the cement and prevent its arching over the outlet.

Water for the mixing operation is measured by a siphon type of tank furnished by the Ransome Concrete Machinery Co. This is arranged with interlocking supply and discharge valves and a control wheel connected to an adjustable cut-off pipe, so that accurate water measurement is easily and quickly made.

The materials making up the batch fall through trip gates into a steel hopper which empties into a 3-yd. Ransome mixer as at the other plant. The mixer is driven by a 60-hp., General Electric, slip-ring motor with drum controller located on the weighing floor above, and is also equipped with a Batchmeter and signal light as at the other plant.

The No. 2 mixing plant. At left, an end view, office in the foreground and cement elevator behind it. Above is a side view with trucks being loaded

The Telautograph for transmitting orders to the weighing room and Standard Register Co.'s ticket machine are also used here, the only difference in the arrangements being that the drivers' room is on the same floor and alongside the dispatcher's office, so that the tickets are passed through a small window opening.

As a result of the improved methods incorporated into this new plant, the weighing and mixing is accomplished more easily and with one to two less men than at the other plant.

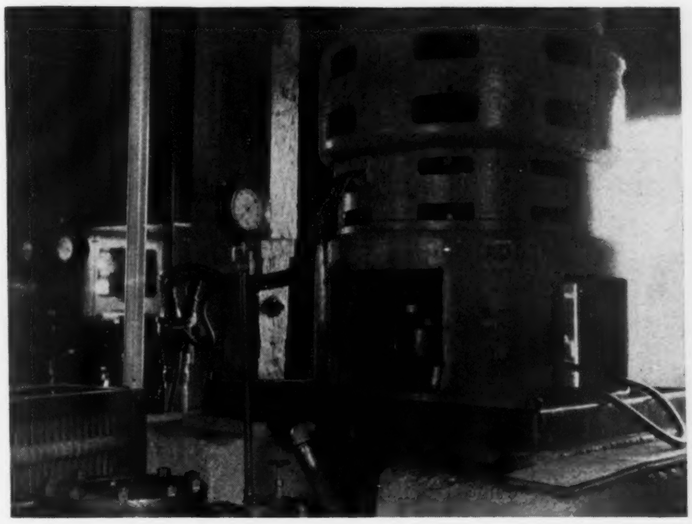
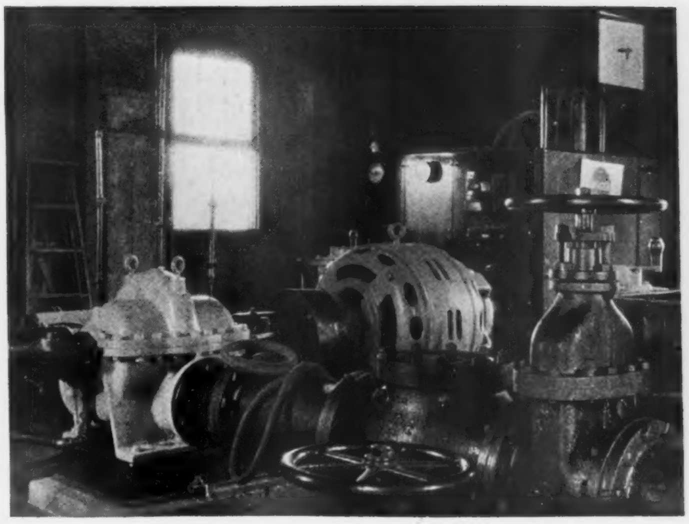
Sand and Gravel Plant

The sand and gravel plant adjoining the No. 1 concrete mixing plant, and from which the aggregate material is obtained, has a few unusual features.

The material is taken from a gravel bank on the opposite side of the street from the

Hopper and belt conveyor which delivers sand to the main conveyor at No. 2 plant

Bins and washing plant at gravel operation

Deep well pump, capacity, 2000 g.p.m., equipped with vertical motor, at Shiely gravel plant, and a centrifugal pumping unit at the right

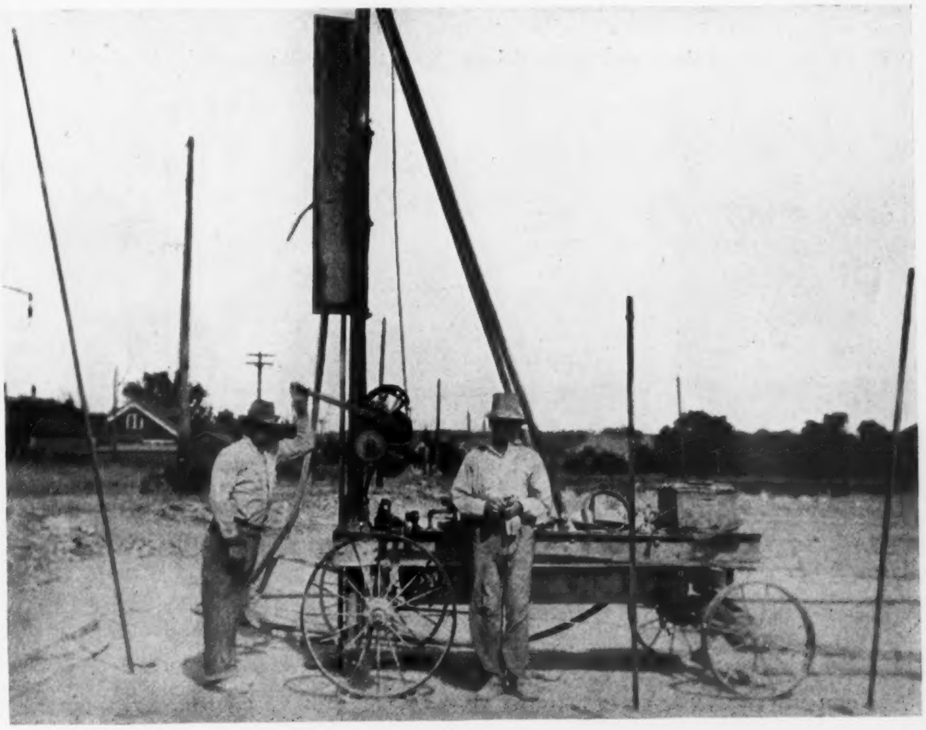
rest of the plant and is carried over the street in an overhead conveyor gallery.

Excavating is done with a 2-yd. Marion revolving type steam shovel mounted on large tractor wheels, loading to 6-yd. wooden, side-dump Koppel cars. Three trains of two cars each are used, hauled by two 8-ton and one 10-ton Whitcomb gasoline locomotives, which haul the material on a loop track to a point near the street where the cars are dumped to a steel hopper feeding an inclined 30-in. belt conveyor.

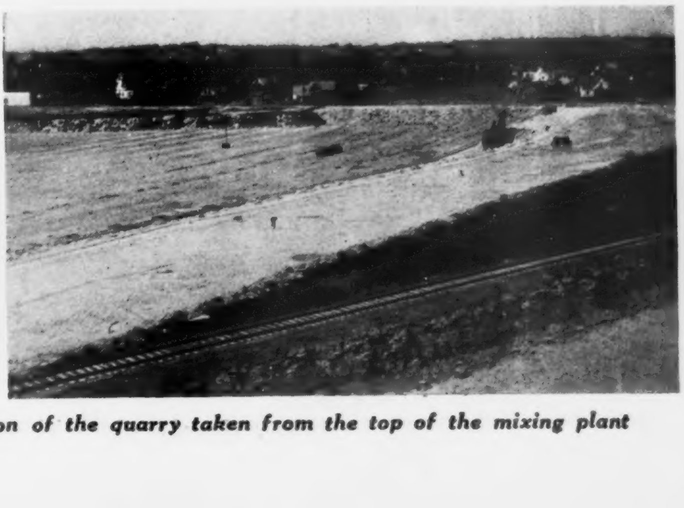
This inclined conveyor discharges to another 30-in. horizontal conveyor which carries across the street on a steel frame gallery, and then on a slight down slope to a scalping house where a revolving screen scalps out any plus 2½-in. material to a 16-in. "Superior" McCully gyratory crusher. All material from this point is carried on another inclined belt conveyor to a second revolving screen where any oversize not wanted in the washing plant is scalped out to two 6-in. "Superior" gyratory crushers. From here it is carried up to the washing plant on a 30-in. inclined belt conveyor, driven at the head end through a Link-Belt, silent-chain drive by a 50-hp. Fairbanks-Morse, slip-ring motor.

Here it is spouted and sluiced to a drum type revolving scrubber about 5 ft. in diameter by 12 ft. long with inside flights, from which it goes to two parallel rows of three conical revolving screens, where it is washed with jets and the three sizes of gravel separated out to the bins below.

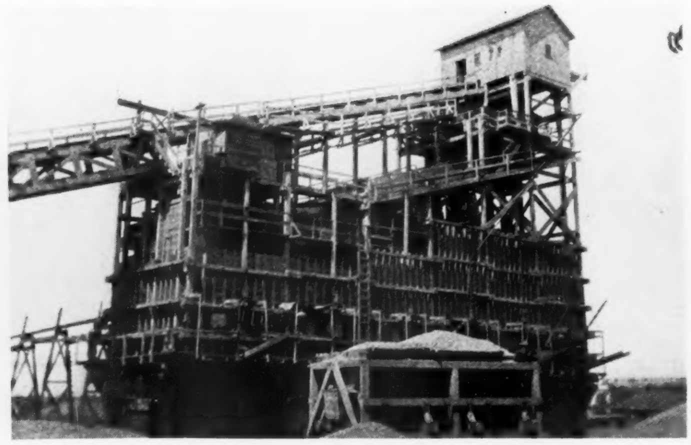
The sand from the last screen on each side



Wagon mounted air drill used in Shiely quarry

The Shiely stone plant at St. Paul and a picture of a portion of the quarry taken from the top of the mixing plant



Washing plant at the left with No. 2 mixing plant in the distance. Also, side view of the washing plant and bins

flumes to two dewatering drag conveyors from which it falls into bins and the wash water flows to the settling pond. The bins are of timber construction on reinforced-concrete columns and floor, and are arranged for loading railroad cars on one side and trucks on the other.

Water for washing, at the rate of about 2000 gal. per min., is supplied from a deep well by an Aurora deep well pump driven by a 200-hp. Ideal vertical motor, pumping to a pond from which it is put up to the plant by a 12-in. horizontal centrifugal pump driven by a direct connected 75-hp. Ideal motor.

The washed material is handled to and from storage by an American locomotive crane with clamshell bucket, which also keeps bunkers for truck loading filled from the storage piles conveniently placed.

The washing plant was built about six years ago, and was designed and the material furnished by the Link-Belt Co., and has a capacity of about 2000 yd. per 10-hr. day.

Quarry and Stone-Crushing Plant

The stone crushing plant from which the aggregate is taken for the No. 2 concrete mixing plant is a standard No. 7½ gyratory plant, with a short quarry incline, to which has been added a belt conveyor stock piling system. It has a capacity of about 1000 yd. per 10-hr. day.

Arrangements have been made to chute the stone from the end of the stock piling conveyor on to the belt carrying up to the mixing plant.

The quarry covers a considerable area, only a shallow ledge of about 10 ft. having been worked. The stone is loaded to 2-yd. steel, end-dump cars by a Marion Model 60 railroad type steam shovel with a 2½-yd. dipper. Two Plymouth 3½-ton gasoline locomotives haul these cars in 4-car trains around to the crusher incline.

The drilling and shooting is unusual and interesting. An X70 Ingersoll-Rand wagon-mounted air drill handled by two men puts down holes 11 ft. deep for 1¼-in. dynamite at the rate of 5½ holes or about 60 ft. per hour. On account of the nearness to a street and residences, these holes are spaced only about 4 ft. apart each way and are shot

Conveyor gallery to carry material over a street to the sand and gravel plant

2-yd. revolving shovel at the Shiely gravel plant loading to 6-yd. cars in the pit

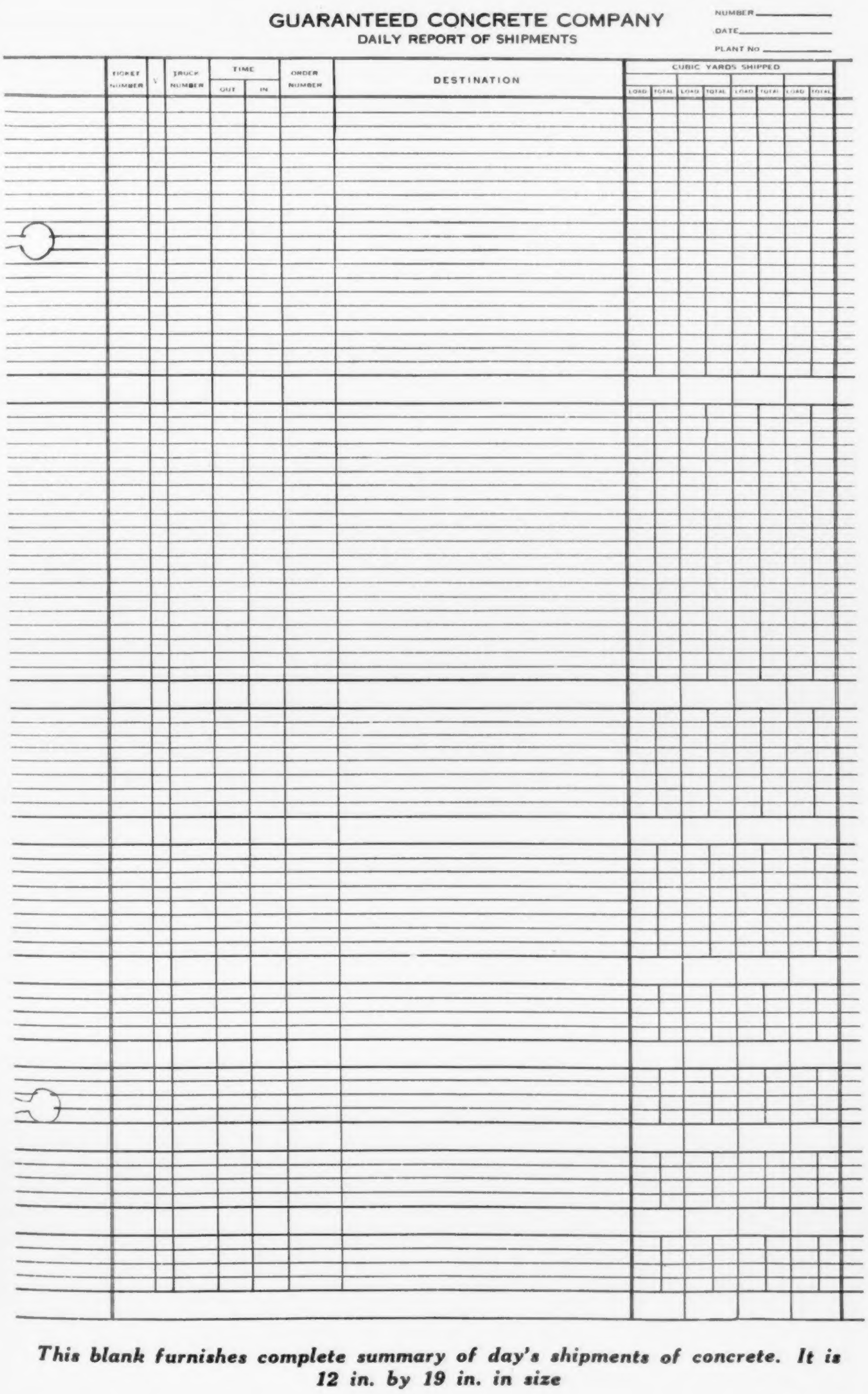
singly or a few at a time with electric exploders, and using about 8 to 10 sticks or a little less than 3 lb. of dynamite per hole.

This shooting, which is not very spectacular, is done without the blaster removing himself very far from the scene of operations, but it breaks up the rather thinly stratified rock sufficiently for the shovel. With a 4 ft. by 4 ft. spacing and 10 ft. depth, this would give a ratio of 4¾ tons of rock per pound of explosive, which is not at all bad. Compressed air for the drill is supplied by a 12-in. by 10-in. Type ERI Ingersoll-Rand air compressor, belt-driven by a 60-hp. General Electric, slip-ring motor. An Ingersoll-Rand power sharpener is used to keep the drill bits sharpened.

General—Personnel

Electric power for these plants is furnished by the Northern States Power Co. and transformed down to 3-ph. 60-cyc., 220-v. About 125 hp. of connected motors are used at each of the mixing plants.

The No. 1 plant has rail connection with the Northern Pacific and Great Northern railways, and the No. 2 plant with the Chicago, Milwaukee and St. Paul railway, with a nominal switching charge from any road entering St. Paul to either plant.


GUARANTEED CONCRETE COMPANY
DAILY REPORT OF SHIPMENTS
NUMBER
DATE
PLANT NO

TICKET NUMBER	V	TRUCK NUMBER	TIME OUT	TIME IN	ORDER NUMBER	DESTINATION	CUBIC YARDS SHIPPED LOAD	TOTAL	LOAD	TOTAL	LOAD	TOTAL	LOAD	TOTAL

This blank furnishes complete summary of day's shipments of concrete. It is 12 in. by 19 in. in size

The delivered prices for 1:2:4 concrete, which is the mix used on most jobs (guaranteed to have a strength of 2000 lb. at 28 days) is from \$8.00 to \$9.05 per cu. yd. on less than 100 yd. orders, depending on the zone or distance from the plant. The 1:2:3½ concrete (2500 lb. per sq. in. strength) is 15c per yd. higher, and 1:3:5 concrete (1500 lb.) is 75c per cu. yd. lower. Orders of more than 100 cu. yd. carry prices 50c per yd. lower than those given on the price list, while heating in winter is charged for at the rate of 40c per cu. yd.

A discount of 5% is allowed for cash or payment by the tenth of the following month.

About 90% of the large concrete jobs in the city are being furnished from these plants, including such jobs as the 6-story, all-concrete Northern States Building, Lowry Hotel addition and 16-story Medical Arts Building adjoining and the 30-story First National Bank Building, which it is estimated will require in excess of 30,000 cu. yd. of concrete. This latter job required going down about 85 ft. with the footings, some of these caissons requiring 200 cu. yd. of concrete each. This was poured at the rate of 40 to 50 yd. per hour, the trucks dumping directly from the street into spouts carrying over to the caissons.

The wide activities and increasing growth of demand for ready-mixed concrete which is developing in the territory served by the Shiely company through its subsidiary, the Guaranteed Concrete Co., apparently is stimulated by the momentum of increasing popularity for this form of building procedure. Guaranteed trucks are a familiar sight on the streets of the twin cities. The company has made the word guaranteed more than just a firm name and contractors in the territory are more and more availing themselves of the facility for securing ready-mixed concrete guaranteed to measure up to a specific strength demanded by the various building projects in which they have an interest.

Of interest in connection with the operation of these concrete-mixing plants is the fact that the cement situation has not been disturbed through these plants entering the field. They purchase their cement through the local dealers who are in competition to furnish the cement for the various jobs.

The main offices of the Guaranteed Concrete Co. and of the J. L. Shiely Co. are at 210 Builders Exchange Building, St. Paul, Minn. J. L. Shiely is president and general manager; A. R. Shiely, vice-president in charge of production; J. M. Shiely, superintendent of delivery and service; H. J. Farrell, secretary and purchasing agent; and D. L. Bell, treasurer.

At the plants, A. O. Nelson is superintendent of the sand and gravel plant; James Finley, superintendent of the stone crushing plant; P. M. Clark, in charge of No. 1 concrete plant, with John P. Lynch as dispatcher; W. S. Johnson, in charge of No. 2 concrete plant, with James Oliver as dispatcher.

New Machinery and Equipment

Improved Duplex Compressor

THE MEDIUM-SIZE duplex compressor of the Ingersoll-Rand Co., New York City, has been re-designed to incorporate various improvements made possible by new developments in metallurgy and in engineering design in recent years.

According to the manufacturer, the principal improvements incorporated in the new compressor are:

Frames are stronger and more rugged to withstand greater horsepower loads and to provide greater reserve strength.

Main bearings are larger, better proportioned, and easier to adjust.

The intercooler on two-stage units is of a new, more efficient design, and is placed transversely across the top of the frame, convenient of access without ladders. By locating it there instead of beneath the cylinders, the pit formerly required is eliminated, all weight is taken off the cylinders, and the required foundation is reduced.

New one-piece cylinders have greater valve areas, producing a higher compression efficiency with reduced power input. Clearances have been decreased to improve volumetric efficiency. More uniform jacketing and better circulation of cooling water saves power, improves lubrication, and prevents distortion. Heads are smaller, lighter and easier to remove.

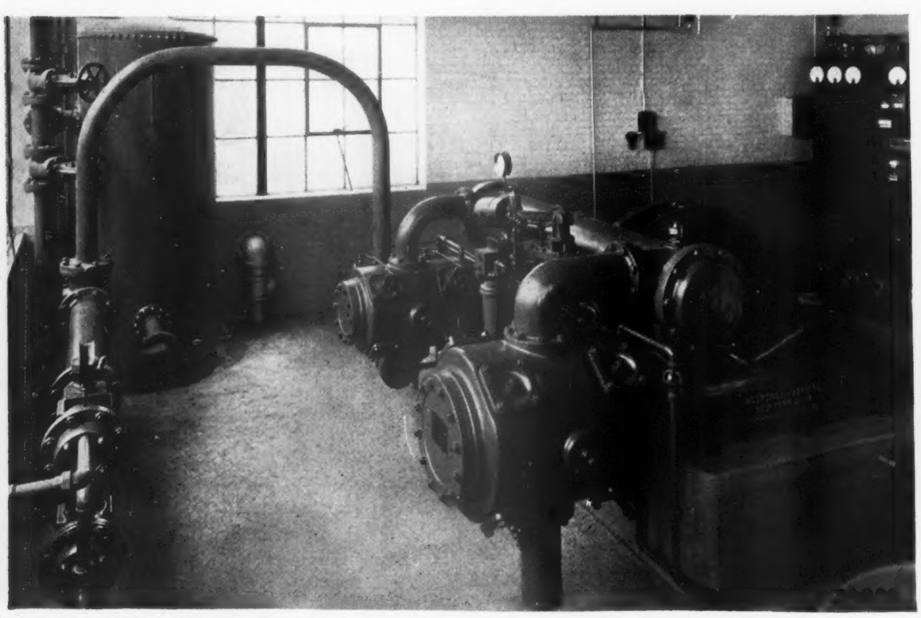
Light, strong pistons aid running balance, and two piston rings insure tightness and improve cylinder wall lubrication.

Ingersoll-Rand plate valves are used throughout, and exceptionally large ports allow unrestricted flow of air. Parts most subject to wear are made of special heat-treated alloy steel.

On clearance control units, new, automatically lubricated, leak-proof clearance valves are balanced to prevent slamming or fluttering and are silent in operation. They are simple in construction, require no adjustments, and will not stick.

New relief valves for unloading motor-driven units eliminate any tendency to stick or hang up.

The new machine is more compact than earlier models with the advantage of reduced space and foundation requirements. It is made in three types, which differ only in the method of drive or the manner of regulation: Type XCB—belt or texrope drive, and clearance control regulation in 5 or 3 steps. Type XRB—belt or texrope drive, and free-air controller regulation in 3 steps. Type XRE—direct-connected, synchronous motor drive. Regulation in 5 or 3 steps by clearance control except on small units, where it is by the 3-step free-air controller. All types can be furnished in either single-stage, or two-stage units, and cylinders are available for all commercial pressures, or for vacuum service.



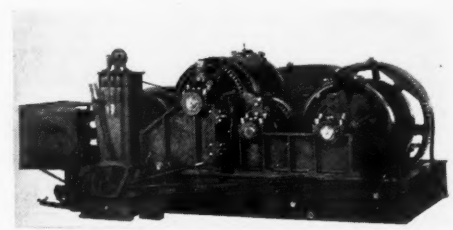
New medium-size duplex compressor has interesting features

Drag Scraper Hoist

STREET BROS. MACHINE WORKS, Chattanooga, Tenn., has developed a new type of drag scraper hoist. In design the new hoist incorporates features taken from the company's two-speed slack-line hoist, and a notable improvement is the plate or disc type friction used on the lower or digging drum. According to the description, this friction is very easily operated and requires very little effort on the part of the operator for throwing it off and on. The upper drum is equipped with the outside band friction and gears are of steel with machine cut teeth, wide face and coarse pitch.

Drums are cast in three pieces, giving castings which it is claimed are free from shrinkage strains and free from blow holes. A distinct advantage of this is that it is only necessary to replace that part which is worn or broken.

Flanges and barrels are machined all over, drilled by templates, assembled and balanced. Each drum is bronze bushed with bushing of large diameter and length. Shaft bearings are bolted to an electric welded and riveted structural steel frame. Levers for operating both frictions and brake are in bank and are furnished as standard equipment. Motor and resistors are mounted on the main frame. A Morse chain drive is also furnished as standard equipment, although a direct gear drive can be had if desired.



New type of drag scraper hoist

Electrode for Welding

A NEW electrode, known as "Stainweld A," for welding the commonly called "18-8 Stainless Steels," is announced by the Lincoln Electric Co., Cleveland, Ohio.

The advantages claimed by the manufacturer of the rod are that by its use welds made can be of the same chemical content as the stainless steel itself, resulting in a dense ductile weld. This is accomplished by having the welding done in a protected atmosphere, thus excluding the oxygen and eliminating oxidation of the weld metal.

The rod itself is of the same chemical composition as the metal and is coated with a material which in the intense heat of welding forms a gaseous envelope around the arc. It is used with reversed polarity and it is claimed permits the making of a weld that is just as impervious to corrosion as the metal it joins.

The new electrode is obtainable in three sizes, 1/8-in., 5/32-in. and 3/16-in. of the regulation 14-in. length.

New Flexible Coupling for Special Applications

A NEW FLEXIBLE COUPLING of the pin and rubber bushing type has recently been placed on the market by the Ajax Flexible Coupling Co., Westfield, N. Y. The new coupling is designated as Type "E" and it is a modification of the standard Ajax Type "A" which the company has marketed for ten years.

The Type "E" is a special coupling of limited size, designed for purposes of economy on special applications, such as centrifugal pumps, small speed reducers, fans, motor generator sets, and, according to the manufacturers, all jobs at motor speeds within the bore and load limitations of the coupling.

The new coupling is made with aluminum alloy flanges, hardened and ground alloy steel drive studs and specially compounded rubber bushings cemented to hard bronze bearings by a new process. It is claimed that it is noiseless, free from vibration, easy to assemble, sets up no backlash and provides free end float.

Aluminum alloy flanges give this new coupling light weight

Due to the use of aluminum flanges, the weight is only 2 lb. per coupling, and the size is 4 in. outside diameter by $2\frac{1}{16}$ in. overall length available at $7\frac{1}{2}$ hp. 1750 r.p.m. on steady loads, $1\frac{1}{2}$ in. maximum bore or special keyways.

A Pump for Concrete

THE CONCRETE PUMP shown herewith is manufactured by Torkret-G. m.b. H., Berlin, Hedemannstr. 13, Germany, under patents owned by System Giese and Hell, Kiel, Germany, according to *Baumarkt*, Leipzig.

Briefly, the unit comprises a concrete hopper, pump, agitator for continually mixing the concrete, a pressure dome and outlet pipe, all mounted on a small chassis for portability. The concrete is fed to the hopper from a concrete mixer, from where it flows by gravity through the agitator and into the pressure cylinder. From here the pumping action causes it to be forced through the pipe at regular intervals to the place of discharge.

Concrete pump, showing hopper, agitator, pressure dome and outlet pipe

The agitator operates at 120 r.p.m. and it is claimed by the manufacturers that the mixing action, together with the cyclic flow through the pipe, actually increases the efficiency of the mix. The interrupted flow of concrete through the tube is caused by the operating cycle of the pump. On the pressure, or pumping stroke, concrete is forced through the tube or pipe, and the flow is interrupted by the back stroke.

A 15- to 20-hp. motor is required to run the unit which is capable of delivering 8 to 10 cu. m. of concrete per hour and the concrete may have a maximum aggregate size of 40 mm. The tubes or pipes used for carrying the concrete from the pump to the job are 12 cm. in diameter and the tube walls are 2 mm. thick. The tube sections, 3 m. long, are joined by means of rubber water and air-tight collars or sleeves.

Concrete can be transported by means of the pump to a height of 40 m. and 100 m. on a level plane.

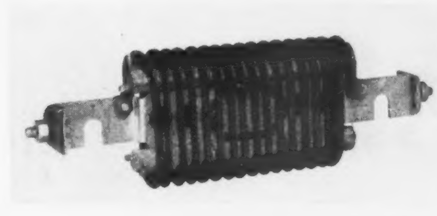
New Electrical Resistors

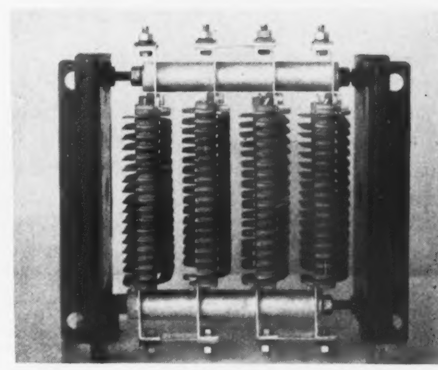
IT IS CLAIMED that easy connections to rigid terminals are made with a new type of edgewise-wound, heavy-duty resistor recently placed on the market by the General Electric Co., Schenectady, N. Y. This resistor, designated CR-9132, is of the unit-box type. Advantages listed by the manufacturer include unbreakable design, non-corrodible conductor, and maximum heat dissipation for minimum space consumption.

The new resistors are mounted on a support consisting of two steel punchings held firmly together but insulated from each other by a new form of heat-resisting molded insulation. Cleats of fired alumina insulate the resistive conductor from the support. These cleats are locked in place after the unit is assembled by bending the projection on the support to prevent their movement. A copper connector, silver brazed to each end of the resistive conductor, permits bolting the extreme end of the resistive material to the support. The ends of these supports, together with clamps, provide ideal rigid terminal connections for interconnections and for user's leads. Good contact between the connector and support is assured by tin-dipping the connectors after brazing.

The new units are offered in the form of a complete line of 20 sizes, covering a current range of from 22 to 136 amperes with a corresponding resistance range of from 2.5 to 0.058 ohms. Four combinations are standard, as follows: (1) without taps; (2) with a center tap; (3) with two taps at 1/3 spacing, and (4) with three taps at ¼ spacing.

Various unit-box combinations can be made up with the new resistors, such as four units assembled and connected in series.





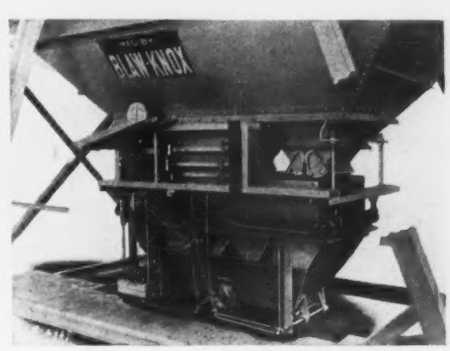
New edge-wise wound, heavy-duty resistor and, above, view of one of its units

By using special molded insulation spacer tubes and collars in such assemblies, the need of mica tubes, mica collars, flat washers and spacers is eliminated, and the assembly of the box is greatly simplified by decreasing the number of pieces to be handled and by eliminating the need for cutting and fitting.

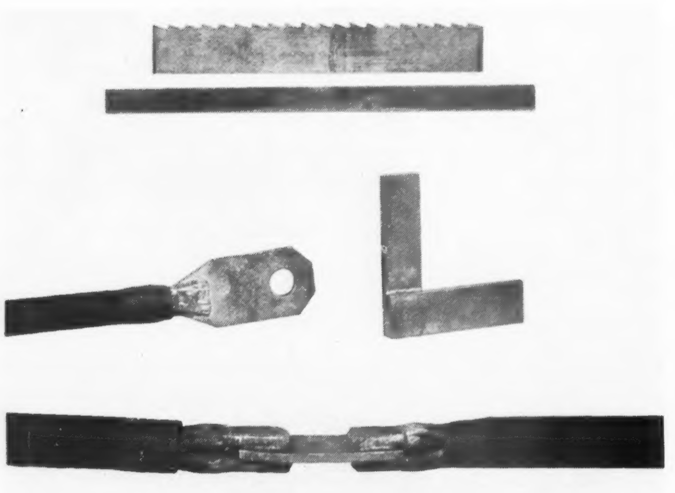
Triple Weighing Batcher

AN IMPROVED type of triple weighing batcher for three-compartment bins is announced by Blaw-Knox Co., Pittsburgh, Penn., and shown in the photograph.

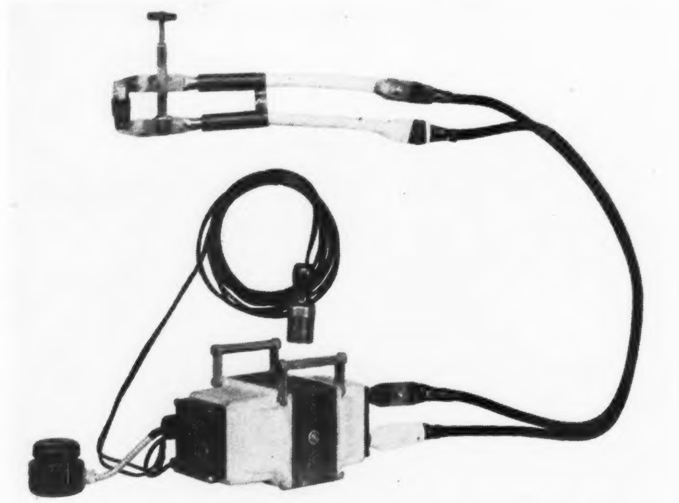
A notable feature, the manufacturers state, is the new clamshell gate for each compartment, with easy lever arrangement for quick operation and accurate control.



Improved weighing batcher



Showing some typical brazed joints made with new resistance brazing equipment



Equipment consists of transformer, foot switch and tongs for holding carbon blocks and work

Electric Brazing Equipment

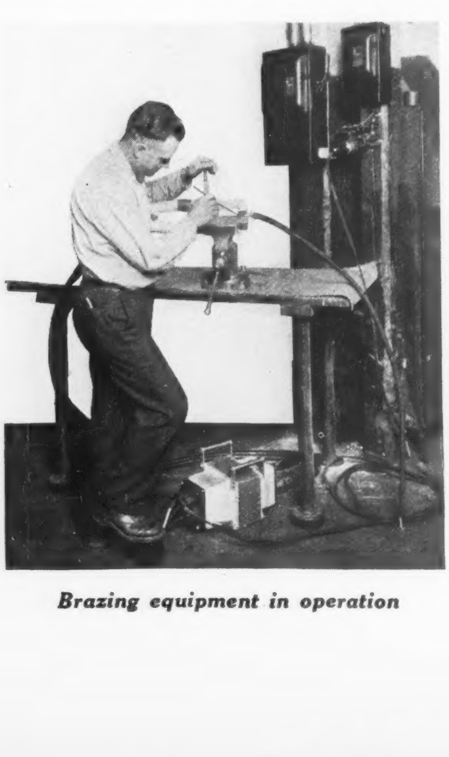
A NEW LINE of electric brazing equipment, with a wide application in all industries, is announced by the General Electric Co., Schenectady, N. Y. The manufacturers state that the method and equipment involved are simple and inexpensive, and have many advantages over other methods of joining metals.

Brazing with this equipment is caused by the heat generated by the flow of electricity through carbon blocks. As these blocks offer high resistance to the flow of electricity, the heat generated is correspondingly high, and but small pressure is needed to complete the joint.

The equipment consists of a transformer, foot switch and tongs for holding the carbon blocks and work. The sizes of the various parts depend on the size of work to be handled and joints to be made. A typical equipment involves a 5-kv.a. transformer weighing 45 lb., having a 220-volt primary and an 8-volt secondary. A 10-kv.a. transformer for heavier duty weighs 95 lb., has the same primary taps and has 8-, 10- and 12-volt taps on the secondary. The secondary taps can be readily changed for different sizes of joints, the higher taps being used for larger sections.

The various parts to be brazed are either designed with flat surfaces to begin with, or are flattened before brazing. After the work is clamped in the tongs, flux is added and the current is turned on by pressing the foot switch. When the flux melts, the brazing alloy is held against the hot metal until the alloy flows into the joint by capillary attraction. During the process of brazing the hot alloy dissolves a thin film of the metal surfaces, thus forming a new alloy which is said to be rich in copper and with a higher melting point than the original alloy.

Many advantages are claimed for this method over soldering, among them being that less time is required, brazing is less expensive, and that the conductivity, mechanical strength and durability are higher than those of the lead joint.



Brazing equipment in operation

Safety Lighting Cable for Underground Illumination

A NEW CABLE designed to withstand the special demands of underground lighting service is announced by the Sullivan Machinery Co., Chicago, Ill.

The new cable is designated as "Stringalite" safety lighting cable, and the manufacturers state that the same qualities that make it well adapted to underground lighting service also make it desirable for use in quarries, open pits and for other surface workings.

It may be hung over any projecting object such as a nail, timber or bracket, with no insulators or special supports required, and installation, extension or removal can be made quickly and easily by workmen on the job. The length may be extended to any required distance from the current source.

"Stringalite" is made of the Rome Wire Co.'s molded rubber "superservice cord," stranded No. 10 two-conductor light cable, into which molded rubber covered, porcelain lamp sockets are vulcanized at 33 1/3 ft. intervals. Cable and connectors are tested at 1500 volts. Sockets and connections are practically unbreakable and standard lamp guards may be used. The heavy coat of tough molded rubber covering the cable, connectors and sockets in one piece, insulates each part against electrical leakage and provides protection against moisture, corrosion and rough handling.

The new cable is carried in lengths of 100 and 200 ft. with three lamp sockets to every hundred-foot length, and end connectors attached. Other lengths may be had on order, with side extension connectors.

Modern Piping Services

A RECENT publication of the Linde Air Products Co., New York, "Oxwelded Construction for Modern Piping Services," presents many facts pertinent to, and advantages of, the oxy-acetylene process for the fabrication of steel and wrought-iron piping for all purposes.

Eight chapters comprise the 77-page book. The first three of these are general in character and the remaining five apply to particular fields of piping construction. It should be of interest to all those contemplating the installation of steel or wrought-iron piping.

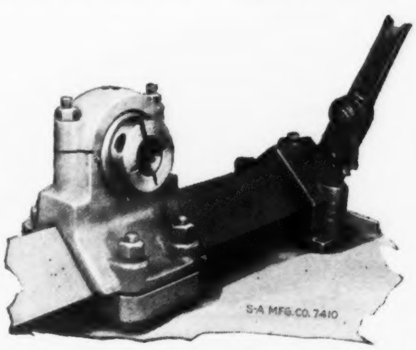
New lighting cable designed for heavy underground service

Improved Belt Conveyor Bearing

THE STEPHENS-ADAMSON MANUFACTURING CO., Aurora, Ill., announces a new roller bearing belt conveyor take-up bearing. The bearing consists of a structural steel angle, upon which slides a Timken bearing in a special self-aligning housing. The bearing is moved backward or forward by a screw, protected by the steel angle, and is operated by a ratchet lever designed for use in cramped quarters. The take-up is furnished for shafts from 1$\frac{15}{16}$ in. up to 4$\frac{15}{16}$ in. diameter, and in sizes with a maximum shaft travel of 24 to 54 in. The inner race is fitted with an adapter which receives the shaft without turning or shouldering.

In connection with the adoption of this new bearing the manufacturers give the following interesting data on the take-up of belt conveyors generally:

"The ordinary belt conveyor consists of a wide endless belt, the upper surface of which carries the load and is supported by idlers



Belt conveyor take-up bearing

spaced every 4 or 5 ft. The belt is usually driven by the head pulley and a certain amount of tension must be maintained to give the required traction to the drive pulley.

"Although conveyor belts are carefully stretched when made, there is a continual stretching or lengthening as the conveyor is used. This does not amount to a great deal, but it is enough to necessitate a take-up pulley to eliminate the slack and maintain a fairly uniform belt tension.

"The maximum tension advisable varies with the width of belt, the number of plies, and the weight of the duck used to reinforce the belt. As an example, the maximum tension for a 42-in. conveyor belt of 8-ply, 32-oz. duck is approximately 9072 lb., as compared with 1152 lb. for a 12-in. belt of 4-ply 28-oz. duck.

"In the normal 42-in. belt conveyor this tension of 9072 lb. is the belt pull at the driving pulley. On the slack or tail end of the conveyor the tension will have decreased to about 3000 lb. This means a total pull of close to 6000 lb. on the take-up pulley with a load of 3000 lb. on each take-up bearing.

"These take-ups are of two general types; the automatic or gravity take-up pulley for long and heavy-duty conveyors, and the screw type for shorter belts. The screw take-up bearing consists of a bearing which can be pulled backward on its base as the belt stretches, and is generally satisfactory for conveyors up to 200 ft. in length.

"These bearings range in size to suit the pulley shaft and in maximum bearing travel to suit the length of the conveyor. As it is considered good conveyor design to provide a take-up travel of about 2% of the conveyor length, a 12-in. adjustment would be suitable for conveyors up to 50 ft. in length, while a 54-in. take-up bearing should be adequate for most belt conveyors up to 225 ft. long."

New Water Cooled Conveyor

THE TRAYLOR VIBRATOR CO., Denver, Colo., announces the introduction of a water-jacket to a tubular vibrator conveyor.

Cold water, under pressure, is injected at the lower rear end of the tube and circulates the length of the tube. The warm water then travels back along the top side of the tube and is released through a valve on the top rear end.

With this water-cooled tube, state the manufacturers, it is possible to handle material up to 2000 deg. F. with a marked cooling taking place in a tube 12 ft. long. Moreover, the tube can be operated as steep as 18 deg. uphill without materially decreasing the capacity. The conveyors, naturally, have greater capacity when operated on the level or downhill.

The vibrator conveyor takes its power from any standard alternating current. Operating under full load, the conveyor requires less than ¾ hp. With each unit a small motor generator set is furnished so that the operator has a positive rheostat control over the amplitude of the vibration. The speed of travel of the material can be varied from 50 ft. a minute to zero by simply twisting the rheostat. Being entirely electrically operated, the tubes have no mechanical wearing parts that require lubrication.

These conveyors are furnished without coolers in open launder type as well as tubular. The tubes range in diameter from 10 in. to 26 in. and are furnished in any length necessary. The pan type or open launder types are furnished in widths ranging from 10 in. to 48 in. and in any length necessary to accomplish the duty. These conveyors are capable of handling up to 200 tons an hour.

New Product for Use with Lubricants

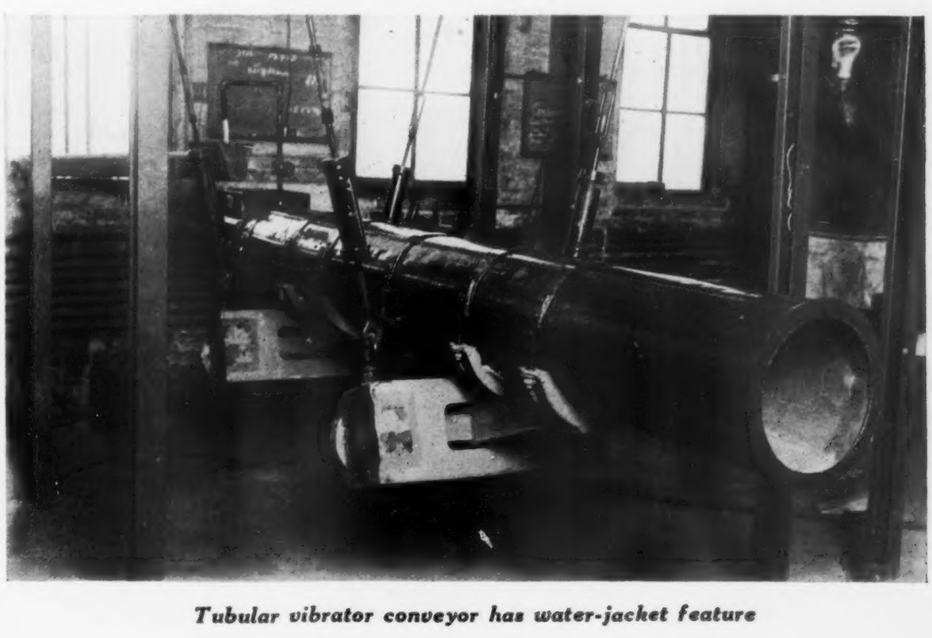
A NEW PRODUCT, with the trade name of "Shaler-Rislone," has been added to the line of the Shaler Co., Milwaukee, Wis.

According to the description. "Shaler-Rislone" is not a penetrating oil, nor is it a "diluting" oil. It leads other lubricants into the tightest places because it has the characteristic of always creeping, its functioning being based upon the law of wetted surfaces. It does not dilute or change the viscosity of the lubricating oil used, and does not contain distillates, acids or other harmful agents.

Among the uses to which the preparation may be put is as a "break-in" agent. It is claimed that its addition to the crankcase oil of new engines, compressors and other machinery where there are rubbing surfaces lubricated with oil permits normal operation immediately without the possibility of harm to the contacting surfaces.

For engines already in service it is maintained that the periodical use of this preparation as a "tonic" increases the maximum power output, as well as the efficiency, and smooths out the operation by eliminating the gums on the piston rings, valve stems, etc., and by increasing the lubricating ability of the regular oils.

It is said that the use of this product added to the motor oil in winter permits easy starting of internal combustion engines, since it flows at 40 deg. below zero.



Tubular vibrator conveyor has water-jacket feature

News of All the Industry

Incorporations

Clark Quarries, Inc., Fort Collins, Colo., $10,000. W. R. Clark, Adelaide J. Clark and I. J. Dilts.

C. B. Clegg Co., Greensboro, N. C., $100,000. To produce crushed stone, cement, lime, plaster, brick, sand and other building materials.

Reed and Vendret, Inc., Quincy, Mass., 1000 shares no-par stock. B. Armand, Peter E. and Bertha M. Vendret, all of Quincy.

Dixie Sand and Gravel Co., Memphis, Tenn., 250 shares at par value of $100 each. L. G. Van Ness, B. W. Cohn and J. P. Longon.

Avery Mining Co., Plumtree, N. C., $50,000. To mine and sell feldspar, mica and other minerals. Harris H. Sanders, W. T. Sanders, Fred J. Fuller and others of Nashville, Tenn.

Illinois Construction Material Corp., Room 1402, 6 N. Michigan Ave., Chicago, Ill., 100,000 shares of no par value. To deal in sand, gravel and clay. M. E. Young, Walter W. Stevens and Justus Chancellor, Jr.

Quarries

Avoca Quarries Corp., Bedford, Ind., has filed papers evidencing final dissolution.

Evans Stone Quarry, Hot Springs, S. D., is installing machinery valued at approximately $6,000.

E. W. Deckard, Bloomington, Ind., plans to form a company to produce sandstone in Monroe county, Ind. He has purchased land east of Harrodsburg, Ind., which is said to contain from 40,000,000 to 60,000,000 cu. ft. of sandstone.

Brookfield Quarry Co., Brookfield, Wash., has the contract to furnish material for the road from Rosburg to Eden, Wash. A large steam shovel and truck crew have been moved to the point of operations and the work is progressing rapidly.

Ada, Ohio. The purchase of a 10-acre tract of land located east of Welcome Park here, by E. C. Taylor, is believed to be the first step toward the opening of a new quarry by the Taylor Stone Co. It is believed that the old quarry, lying southwest of the park, will be abandoned next year and operations started on the new site.

Clinton, Mass. The city's new municipal stone crushing plant is now in full operation at the Carboni ledge on the crest of Burditt Hill, where a new quarry was opened for its operation. The plant is working at full capacity furnishing stone for the building of highways. Funds for the plant and for the opening and operation of the new quarry have been taken from the appropriation made for the construction of highways, but the plant will be used later for the general work of the road department after the completion of the first mile of highway.

Sand and Gravel

McGrath Sand and Gravel Co. is making numerous improvements at its North Forreston, Ill., plant, including the erection of an 800-ft. spillway which was recently completed.

Wolf River Sand and Gravel Co., Memphis, Tenn., has opened a branch office at Jackson, Tenn., in charge of A. S. Johnson. The company is now sales agent for the Smiley Sand and Gravel Co. of Perryville, Tenn.

Loudon Sand and Gravel Co., Loudon, Tenn., according to S. P. Darmel, president, is planning to move its plant to Chattanooga, Tenn. Production facilities of the operation will be expanded and the firm's capital increased.

Lind Gravel Co. and the **Bellingham Concrete Products Co.**, both at Bellingham, Wash., held their annual employes' picnic at Shore Acres, Birch Bay, recently. A picnic dinner, contests and sports were arranged by the committee in charge and a good time was had by all.

Riverside Sand and Gravel Co.'s plant at Newton Lower Falls, Mass., was damaged to the extent of $10,000 by a fire which partly destroyed a two-story wooden building used for making concrete blocks. Valuable mixing machinery was ruined by the flames and it was several hours before the blaze could be extinguished.

Burlington, Wis. The county board of supervisors recently authorized the purchase of nearly four acres of gravel land adjoining the county gravel pit west of the city, which will supply the county's gravel needs for some time to come. Engineers estimate that there are 150,000 cu. yd. in the tract. The property was purchased for $4,500.

Cement

Universal-Atlas Cement Co., Chicago, Ill., according to newspaper reports, will soon begin construction of a $1,000,000 electrical dust collecting plant at Buffington, Ind. The company has also leased the front half of the 13th floor of the building at 1616 Walnut St., Philadelphia, Penn.

Marquette Cement Manufacturing Co., Chicago, Ill., has awarded general contract to A. D. Gates Construction Co., St. Louis, Mo., for extensions and improvements in its storage and distributing plant at St. Louis. Expansion and improvements will cost about $80,000 with equipment.

Alpha Portland Cement Co., Easton, Penn., is reported to be planning an expansion and improvement program at its Bellevue, Mich., mill, including the installation of additional machinery to approximately double the present output. It is estimated that the improvement program will cost more than $900,000, and work will begin at an early date.

Medusa Portland Cement Co. has temporarily suspended operations at its plant east of Dixon, Ill. This is the first time the plant has been shut down since its opening, and according to Superintendent W. E. Wuerth it is hoped that operations will be resumed by September 1.

Beaver Portland Cement Co.'s plant at Gold Hill, Ore., resumed operations August 13 after a shutdown of nearly three months. The shutdown was due to a slide at the quarry which cut off the limestone supply at the plant. While the debris was being cleaned up, annual repairs usually made during the holidays were completed.

Lime

Leesburg Lime Co., Leesburg, Va., incurred a loss which is estimated at $10,000 when a fire, said to have started from a boiler, entirely destroyed a large frame building with valuable machinery at the company's operations at Leesburg.

Agricultural Limestone

E. C. Schroeder and Co., McGregor, Iowa, have planned an agricultural limestone display for the National Fair, at which they will show samples of limestone of all descriptions for agricultural use. They recently had a display at the Elkader (Iowa) Fair and each day gave away 25 tons of agricultural limestone to farmers, which will also be done at the National Fair.

Personals

W. B. Foshay of Minneapolis, Minn., is now general manager for the Mountain Cross Granite Corp., Salida, Colo.

P. H. Medler has been appointed Long Island (N. Y.) representative of the Alpha Portland Cement Co., Easton, Penn. He formerly represented the Keystone Cement Co. in Westchester county, New York.

E. A. Whitney, who has been connected with the A. P. Green Fire Brick Co., Mexico, Mo., for 13 years, during the last three years as manager of the specialty department handling high temperature cements and plastic refractories, has resigned to take the same position with the Mexico Refractories Co.

Frank Barton has been appointed southwestern sales manager of the Universal Gypsum and Lime Co., with headquarters at the company's office in Kansas City, Mo., at 1012 Baltimore Ave. Mr. Barton comes to Kansas City from Des Moines, Iowa, where he was sales supervisor for the northwest sales district, including North and South Dakota, Iowa, Nebraska and Minnesota.

A. W. Heyman, research chemist of the Universal-Atlas Cement Co., Northampton, Penn., delivered an address on the history of cement and the cement industry at a weekly dinner meeting of the Northampton Exchange Club at River View Lodge. Mr. Heyman discussed the origin of cement and pointed out the growth of the industry since the first year of its manufacture in this country.

B. W. Druckenmiller, for the last two years sales manager of the Pennsylvania-Dixie Cement Corp., New York City, has been appointed assistant general sales manager of that company. Before joining the company he was for more than 16 years with the Crescent Portland Cement Co., Wampum, Penn. F. J. Selinger, Jr., formerly with the Atlas Portland Cement Co., New York City, has been made sales manager of Pennsylvania-Dixie.

James G. Booker, traffic manager of the North Carolina Granite Corp., Mount Airy, N. C., has been elected a member of the board of governors of the North Carolina Traffic League. This organization was formed about a year ago to assist the North Carolina Commission in its transportation and traffic work and to co-operate with and assist shippers of the state in handling their problems so that a better understanding of their needs along this line might be had.

John B. Cabanis, now sales manager of the Northwestern States Portland Cement Co., Mason City, Iowa, was intimately acquainted with the famous Maj. H. O. D. Segrave, British speedster and business man, who was recently killed. Mr. Cabanis became acquainted with the major in 1929 while he was sales organizer for the Portland Cement Selling and Distributing Co., Ltd., of England. His services had been loaned to the English company by the Atlas Portland Cement Co., with which company he was then connected, and when he decided to return to the States after three years work in England, Major Segrave was named to succeed him. Mr. Cabanis made his acquaintance at that time, and recalls having been a passenger many times in cars driven by the famous major.

Manufacturers

Link-Belt Co., Chicago, Ill., has moved its Baltimore offices from 800 Maryland Trust Bldg. to 913 Lexington Bldg., Baltimore.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has opened a new branch at Emeryville, Calif., to take care of increased business on the Pacific coast.

General Electric Co.'s broadcasting station WGY, at Schenectady, N. Y., has inaugurated a new feature in connection with the company's program at 8 o'clock (eastern daylight time). E. L. Manning of the Research Laboratory is presenting a series of short, popular sketches outlining various research and engineering achievements of the electrical industry. The subjects to be included in the series will cover the broad field of electricity in all its applications.

Haynes Stellite Co., Kokomo, Ind., a unit of Union Carbide and Carbon Corp., has announced the completion of a new foundry at the Kokomo Works which has been built expressly for the manufacture of Hastelloys, a group of new acid-resistant alloys. The Hastelloys, state the manufacturers, form a group of corrosion-resistant alloys with unique properties and should be of particular interest to chemical engineers and others who are faced with the problem of providing suitable equipment for resisting the action of hydrochloric acid and moist chlorine.

Bay City Shovels, Inc., Bay City, Mich., are marketing a new convertible machine, the Bay City Cranemobile, a development from the Bay City tractor shovel, the principal difference being that the new machine is rubber tire mounted. In addition to standard crane attachments, such as clamshell, hook and block, electric magnet, etc., it is available with shovel dipper, trench hoe or skimmer bucket. The tractor shovel is to be continued in production, as the Cranemobile is intended for another field of work where hard surface conditions favor a rubber wheel mounted machine rather than crawlers.

Union Carbide and Carbon Corp., New York City, announces that construction work is now under way on its new hydro-electric and steam-electric power plant developments in the vicinity of Hawks Nest, Gauley Junction and Boncar, W. Va. The hydro-electric power development is being built on the New river between Hawks Nest and Gauley Junction, and will consist of a dam across New river, an intake, a power tunnel, surge tank, steel penstocks and power house. The steam-electric power plant is being constructed on the Kanawha river, immediately adjacent to the site of the proposed industrial plant of Electro Metallurgical Co. at Boncar, which will utilize the power output of both plants. It will consist of two steam turbo-generator units, each with a capacity of

When you are buying Crushers

what points do you consider?

Style "B" Newhouse Crusher

First of all, you want a crusher that will yield best return on your money. That includes, not only first cost, but also maintenance and operating costs.

You want a crusher easy to feed and that will produce a maximum capacity of stone of desirable shape and screen analysis. It should be of simple construction with internal parts readily accessible, and that has been thoroughly tested under actual operating conditions.

The Newhouse Crusher is such a machine. Its short, rapid, crushing stroke gives it high capacity with a high percentage of the finished product of desired shape and size. It has a high ratio of reduction. Its direct-connected motor, cable suspension, positive oiling system, and simple and sturdy construction are other advantages. And it is built by a Company with over 50 years experience in the building of crushing machinery.

Products of Allis-Chalmers

Complete equipment for crushing, screening, and cement plants; mining and metallurigal plants;—jaw, gyratory and roll crushers; rotating and vibrating screens; multi-roll sizers; elevators, and hoists; washing equipment; motors, pumps and drives.

Write for a bulletin on Allis-Chalmers crushing plant equipment.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

22,500 kw., or a total capacity of 45,000 kw. or 60,000 hp., and this plant will even out the irregularities of power supply which naturally occur in a hydro-electric power plant situated on a stream where the flow is not regulated. The hydro-electric and steam-electric plants are expected to provide an average combined annual output of about 120,000 hp.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Shovels. New broadside illustrating and describing Marion gas-electric shovels—power transmitted through wires instead of clutches—ruggedly constructed and efficient in operation. THE MARION STEAM SHOVEL CO., Marion, Ohio.

Aftercoolers. Bulletin **No. 150** illustrating and describing aftercoolers for cooling and drying air after it is compressed and before it is delivered into service pipes, in the flat, vertical and wall types. PENNSYLVANIA PUMP AND COMPRESSOR CO., Easton, Penn.

Asphalt Pavements. A survey of street paving in the principal American cities, entitled "The Trend of Paving in the Leading American Cities," compiled by the Asphalt Institute from figures officially reported by the city engineers. THE ASPHALT INSTITUTE, 801 Second Ave., New York City.

Dust Collectors. A reprint from the June, 1930, *Chemical Markets* calls attention to value of dust collection both from the standpoint of health and profits, and emphasizes importance of collecting dust at its source. Examples are cited of the actual money savings from such collection, and other intangible benefits. DUST RECOVERING AND CONVEYING CO., Cleveland, Ohio.

Fireproofing Insulation Material. Folder illustrating and describing Thermax building material, which the manufacturers describe as lighter than gypsum boards and blocks and stronger than fiber boards. Claimed to have insulation, fireproofing, sound-deadening and acoustical properties, and to be successfully used as a base for plaster, stucco, cement and plastic paints. THERMAX CORP., Seattle, Wash.

Waste Heat Boilers. Bulletin **WB-30-2**, unusual type of waste heat boilers, consisting of heating elements built of seamless steel tubes covered with cast iron extended surface, reamed to size and shrunk on the heating tubes. The book shows several designs, installations and details of construction which will be of interest to those having waste gases at temperatures above 500 deg. FOSTER WHEELER CORP., New York City.

Explosives. Bulletin entitled "Brands of du Pont Explosives and Uses to Which They Are Adapted," consisting of the sixth edition of a chart issued for the purpose of aiding users of explosives to avoid the purchase of unsuitable explosives and to select those which will give the best results in proportion to cost. Chart has been revised to include new explosives added to the list of du Pont brands during the past year. E. I. DU PONT DE NEMOURS AND CO., Wilmington, Del.

Diesel Engines. Bulletin **S-500-B2A** (superseding **S-173**) is a 43-page booklet describing Worthington vertical, 4-cylinder, air-injection Diesel engines. The various parts are illustrated and described in detail, and diagrams of the three-, four-, five-, six- and eight-cylinder engines are included. A portion of the booklet is devoted to illustrations of installations of the different types at various plants in this country and abroad. WORTHINGTON PUMP AND MACHINERY CORP., 2 Park Ave., New York, N. Y.

Heavy Duty Box Car Loader. Two illustrated data sheets giving descriptions and specifications of new S-A heavy duty box car loader and also standard loader that has been on the market for some time. A new use is featured for these portable loaders; not only are they used to fill box cars, but they will throw bulk materials far enough to distribute the cargo in the hold of freight boats, according to the manufacturer. STEPHENS-ADAMSON MANUFACTURING CO., Aurora, Illinois.

Resistance Thermometers. Catalog **No. 80** is a 28-page illustrated booklet treating in detail of L and N resistance thermometers for recording, controlling and indicating temperatures. Considerable space is devoted to heating and ventilating applications, applications in refrigeration and chemical plants, in gas-making and other comparatively low temperature applications. Precision equipment is listed, temperature difference equipment, thermometer indicators, thermometer recorders and thermometer controllers with accessories. LEEDS AND NORTHRUP CO., Philadelphia, Penn.

Material Handling Machinery. A 32-page catalog, handsomely printed, entitled "The Barber-Greene Line" and containing a general review of the entire line of the company's material handling machinery. A page is devoted to each machine, and shows a large photograph, brief description and general specifications and features. At the beginning of the book is a section devoted to illustrations of the various machines in operation. The review includes descriptions of six different kinds of conveyors, four types of bucket loaders, four different vertical boom ditchers, and six coal handling machines. BARBER-GREENE CO., Aurora, Illinois.

G-E Bulletins. GEA-1158-A (superseding **GEA-1158**) gives a chart for determining the cost of operating electric appliances and motors, with instructions for use. Average current consumption of different horsepower motors at full load is also given. **GEC-90** lists advantages of Textolite for gears. This product consists of a cotton fiber held in compression by a synthetic resin acting as a binder and process under a high degree of heat and pressure. **GEA-1294** describes a line of direct-current motors with base and pedestal bearing construction for moderate and heavy duty service and applicable to power shovels, hoists, compressors, car dumpers, etc. GENERAL ELECTRIC CO., Schenectady, N. Y.

G-E Bulletins. GEA-1265A on the CR2992-A1 thermostat for use with industrial heating units. **GEA-1283** on CR3012 cam-type master switches for use with either reversing or nonreversing magnetic controllers where an easily operated controlling unit is required. **GEA-1284** on CR9441 geared-type limit switches, cam-operated, with current-carrying parts cadmium-plated, and contacts interchangeable with the cam-operated master switches and track-type limit switches. **GEA-1285** on CR9441-LS-438 track-type limit switches for control circuits, 600 volts alternating current or direct current, with such distinctive features as double-break silver contacts and cadmium-plated current-carrying parts. **GEA-1287** giving descriptive data, dimensions, weights and locomotive ratings on 85-ton industrial haulage locomotives. **GEA-1295** on CR9132 edgewise-wound resistors for alternating- and direct-current service; unbreakable and noncorrodible. **GEA-394B** on induction motor-generator sets, ⅞ to 35 kw., 125 or 250 volts. **GEA-977B** on fractional-horsepower capacitor-motors, Type KC; single-phase, high-torque, 110 and 220 volts. **GEA-1291** covering copper brazing and copper-brazing furnaces. **GEA-1280** on centrifugal compressors. GENERAL ELECTRIC CO., Schenectady, N. Y.

Compressors. Bulletin **No. 83-T,** describing the Sullivan "WL-22" and "WL-44" vertical, single-stage air compressors, direct driven by electric motors. Units built in capacities from 120 to 240 ft., the larger unit being a four-cylinder machine. Catalog **No. 83-X** covering straight line compressors. The "WG-6" straight-line, single-stage compressors of the belt-driven type are described in this catalog, which is fully illustrated, with details of the machine and installation photographs. Catalog **No. 83-Z** on high-pressure compressors, illustrating and describing vertical two-stage compressors, both belt-driven and direct-connected, for small unit capacities in pressures from 150 to 400 lb. per sq. in. SULLIVAN MACHINERY CO., Chicago, Ill.

Commercial Concrete Plants. Bulletin **No. 180** on Butler concrete plants for the mixed-in-transit method, describing various loading plants for truck-mounted mixers, including two types of portable plants for top-loading and end-loading truck mixers; a 135-cu. yd. plant, fully enclosed for winter operation; and a 215-cu. yd., three-compartment plant with separate bucket elevators for coarse and fine aggregates and bag cement. Bulletin **No. 190** on concrete plants for the wet batch method, describing a 215-yd., three-compartment plant with separate reserve storage bin for bulk cement and screw conveyors and bucket elevator for handling, as well as several other large capacity plants. BUTLER BIN CO., Waukesha, Wis.

Electric Motor Drives. Booklet of 63 pages gives advantages of synchronous motors in industry. It explains the theory of the synchronous motors and also the power factor. Starting torque, pull-in torque, starting current, pull-out torque, automatic control and reliability features of the E-M motors are brought out; flywheel effect problems are also covered. Applications with air and gas compressors, fans and blowers, pumps, crushers, hogs, motor-generator sets, vacuum pumps, line shafts and Buhr mills are described. Their use in cement mills and crushing plants is especially interesting. E-M capacitors and alternators are also included. The booklet is profusely illustrated and is enlightening. ELECTRIC MACHINERY MANUFACTURING CO., Minneapolis, Minn.

New Arizona Lime Plant in Operation

JOHN T. SHEFFIELD and Claud Harmon returned recently to Jerome, Ariz., from Douglas and Tucson, where they attended a meeting of the officers and board of directors of the Storey Lime Co.

The officers of the Storey Lime Co. are Alfred Paul, of Douglas, president; Alfred Paul, Jr., vice-president, and J. T. Sheffield secretary and plant manager.

The plant and property are at Perkinsville, on the Verde river. The company was organized with a capital of $100,000 and the new plant was constructed and placed in operation on July 24, 1930. The place of operation has an immense body of the finest limestone known, and a remarkable recovery of an exceptionally excellent grade of lime is being made. The mines of the Verde district, the Santa Fe railroad, and mines at Oatman are the principal consumers.

The plant is built with the idea of economical operation, and the huge limestone deposit lying high on the hillside makes it a gravity proposition, almost entirely automatic.

The rock runs by gravity to the kilns, and from the kilns runs by gravity to the sorting bins, and from there by gravity into the cars.—*Jerome* (Ariz.) *News.*

* * *

About $50,000 in equipment have been installed at Puntenney, another plant where production is around 18 tons of lime a day, and in connection with it two by-products, a flux used in the smelting of ores and lime screenings. Experience has proved that lime can be produced $2 cheaper a ton at Perkinsville than at Puntenney, Mr. Harmon said.

More equipment is to be installed yet and also the construction of a large warehouse.—*Prescott* (Ariz.) *Courier.*

Illinois County Experimenting with Asphalt-Gravel Highways

WORKMEN for the county, under the direction of Truman L. Flatt, county highway superintendent, have practically completed the first half mile of a new type road which may prove to be the salvation of gravel roads in this county.

The road in question is made with a combination of small gravel, with a 50% mixture of sand, mixed with a half gallon of road oil to the square yard of surface.

The new process road, the finishing touches of which were put on August 12, is built on a half mile stretch on the old Jacksonville dirt road from the end of the Fayette avenue paving to about 100 yd. beyond the entrance to Capitol B mine.

An oil base is first put down on the road, to make the drive as waterproof as possible, after which the sand and gravel are placed on the road and mixed with a scraping process until the oil, gravel and sand are thoroughly blended. The road is then smoothed off and travel on the highway is expected to solidly pack the roadway into a dust-proof, durable highway.

Should the experiment prove satisfactory, other dirt highways in the county will be accorded similar treatment, according to Mr. Flatt.—*Springfield* (Ill.) *State Record.*